Australian Personal Computer

WINDOWS GUIDES: 16 BOOKS REVIEWED

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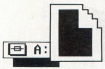
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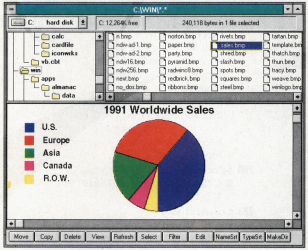
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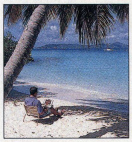
PCSuper Market
NOVEMBER 1992

The magazine for direct buyers

This month's issue looks at third-party maintenance and what to look for when buying a monitor

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Peter Keen, executive director and founder of the International Center for Information Technology on the island of St John in the US Virgin Islands, speaks candidly with Helen Dancer about taking advantage of the current state of information technology and succeeding.

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PSA delivers findings on software prices inquiry

Wide-ranging uses of computer software — across business, domestic and educational domains — overall higher pricing with a propensity to boost foreign debt, and the contribution of this higher pricing to reduce competitiveness and employment opportunities, has led PSA chairman Professor Alan Fels to recommend that the import provisions of the Copyright Act 1968 be repealed, and that parallel importation of packaged software and accompanying manuals become,legal practice.

Further changes to the Copyright Act were also recommended to tighten border controls on illegal entry and impose more stringent penalties on software pirates.

The decision, contained in a draft statement, is supported by the inquiry's finding that Australian PC users have paid an average of 49 per cent more than their American counterparts in the three years to July 1992 for their computer software, a situation which Professor Fels described as detrimental and intolerable.

Professor Fels also claimed that data supplied to the inquiry refuted the widespread fears of the industry that lifting restrictions on importation would lead to a reduced ability to provide technical support and after-sales service, highlighting that these costs were a 'minor' part of the total cost of software production and distribution.

The inquiry revealed that the software market had experienced a real annual growth rate of 7.3 per cent, well above the average GDP in Australia of 3.3 per cent. Lifting restrictions, according to the statement, will both sponsor growth in this sector and stem the flow of capital to offshore vendors.

The statement estimates the net employment gain after five years of parallel importing to be more than 1200 jobs, due to productivity increases from greater access to technology, along with accumulated cost savings applied to investment and capacity expansion.

"Net external debt is also likely to be cut by almost $700 million as a result of an anticipated 20 per cent reduction in (imported) computer software prices," Professor Fels said.

Vendors and industry bodies will be invited to make submissions and comment on the draft findings before the final report is drawn up in December. However, an early statement from the BSAA disputed the 49 per cent cost variable and expressed concerns about the initiative's ability to stimulate employment.

Helen Dancer

DEC, IBM reveal plans for RISC-based PCs

The next generation of RISC-based PCs is coming into sharper focus with DEC expected to unveil its first computers based on its 64-bit Alpha chip this month, and IBM and Motorola releasing details of their first PowerPC chip.

While the machines DEC will deliver initially are designed to run the VMS and OSF/1 operating systems, and will start in price at over $30,000, DEC officials have said they will release an Alpha-based PC, costing less than $10,000, when Windows NT is released in mid to late 1993.

DEC's Alpha PC will deliver between 80 and 100 SPECmarks in performance. The system will feature 16 to 128M of memory and six Extended Industry Standard Architecture (EISA) slots, DEC officials said.

Meanwhile, IBM and Motorola have announced that they have produced their first PowerPC ship, destined to be included in RISC workstations sold by IBM and Apple.

The first PowerPC processor, called the 601, will move into volume production in the middle of next year, appearing in systems to be released by the end of 1993, IBM officials said.

The 601 is a combination of the architecture of the single-chip processor employed in IBM's RS/6000 Model 220 with the internal bus used in Motorola's 88110 RISC processor.

While the 601 processor delivers 40 or 50 SPECmarks operating at 50 or 66MHz, later versions of the PowerPC chip are expected to far exceed this. Future CPUs will be designed from the ground up for applications from portables to symmetric multiprocessing servers, officials said.

Chris Bowes

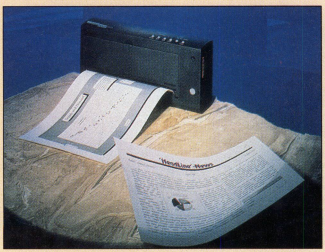
Windows for Workgroups a 'cool scenario'

Visiting expatriate Australian and former Microsoft Australia

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NEWSPRINT



HP releases LaserJet 4 and expanded inkjet range of printers

Hewlett-Packard (HP) has released its next-generation LaserJet 4 laser printer, boasting an output of 600 dots per inch (dpi) and a performance of eight pages per minute (ppm), as well as beefing up its inkjet range and introducing its first portable printer.

New features for the $4143 LaserJet 4 include a bi-directional interface that allows users to find out, for example, that the printer has run out of paper; the ability to automatically switch between parallel, serial and optional network interfaces; and support for TrueType fonts.

A PostScript version of the printer, the LaserJet 4M, is designed for Macintosh and mixed computing environments. It includes 6M of RAM, compared with the standard 2M, integrated Adobe PostScript Level 2 software, and costs $5375. It automatically switches between parallel, serial and LocalTalk networks.

PostScript is also available to upgrade the LaserJet 4 printer. Both printers automatically switch between PostScript and the HP PCL 5 printer language.

Despite its higher resolution, the LaserJet 4 exceeds the performance of the earlier III series, HP officials said, through the use of a 20MHz Intel 80960 KA-20 RISC processor and enhancements to PCL 5 which optimise printing of complex graphics.

HP last month also introduced a pair of dual-cartridge colour inkjet printers and its first entry into the portable printer market.

HP's DeskJet 550C printer for PCs and DeskWriter 550C printer for the Macintosh offer simultaneous true black and colour printing, HP officials claimed. The two printers, both priced at around $2000, hold two cartridges — one for text printing and the other for colour graphics.

With a resolution of 300 dots per inch (dpi), both printers can print text at three pages per minute. A full-colour page can be printed in approximately four to seven minutes, depending on the application and the ink density, HP officials said.

The dual-cartridge implementation means the printers can print a merged text and colour graphics page up to four times faster than on the earlier HP DeskJet 500C and DeskWriter C printers. HP will continue to sell the 500 series printers for the reduced price of around $1500.

HP's new entry in the portable printing market, the DeskJet Portable, is claimed to offer the same performance and quality as the HP DeskJet 500 printer in a compact 2kg package.

The DeskJet Portable boasts three-page-per-minute, black-and-white printing at 300dpi, officials said. Measuring about half the size of a notebook computer, the new portable printer will sell for around $1100. A cut-sheet feeder, which also weighs around 2kg, costs around an additional $175.

Chris Bowes

Microsoft Windows for Workgroups

Microsoft has launched Windows for Workgroups in Australia, with a promise that it will be the first of a new generation of software products that will change the way people work together.

Speaking at the launch, Microsoft managing director Daniel Petre used the launch of Windows for Workgroups to unleash the latest buzzphrase, 'cool scenario', upon the local IT community.

Windows for Workgroups is, according to Petre, a perfect cool scenario, bringing together the essential elements of Windows capability and optimising them for groups rather than focusing on individual productivity.

Placing the Windows for Workgroups development strategically between the existing Windows 3.1 and the yet-to-be-released Windows NT 3.1, Petre described Windows for Workgroups as a subset and forerunner of Windows NT. It is a fundamental strategy to extend the operating system, providing functionality in flexibility, with an underlying communications structure tying users and applications together with the MAPI interface across the DOS, Windows and Mac platforms.

The structure of Windows for Workgroups which evolved, according to company officials, from the overwhelming demand from users for the need to make better use of the network, is comprised of the existing functions of the Windows environment extended by built-in network capabilities, mailing and scheduling, network applications integration, added security, and ease of use in the areas of set-up, information sharing and administration.

File sharing can be achieved through a conventional server-driven LAN or as a peer-to-peer setup, with users choosing to grant 'share' attributes to files or peripherals such as printers. The decision to share resources rests with the owner/user who can restrict access at any time, regardless of whether those resources, designated as shared, are currently being used by other members of the workgroup.

The new environment also utilises multimedia-enabled functions such as a 'chat' line, which simulates a telephone ring and launches a real-time, keyboard-based dialogue between members of the workgroup.

The development is 'a logical expansion', according to current Australian managing director Gary Jackson, to offer within the Windows environment, a more effective approach to information sharing. Its aim is to maximise data integrity across applications, give greater attention to specific business problems, deliver more powerful back ends and friendlier front ends to existing processing capabilities, and deliver a greater competitive advantage from using the graphical platform.

Windows is currently estimated to have an installed user base of over 10 million copies worldwide and be growing at a rate of one million copies per month, of which an estimated 40,000 a month are being bought in Australia.

Pricing for Windows for Workgroups reflects its unusual status as a hardware/-software combination, and begins with the software-only option — the Windows for Workgroups base product that contains the standard Windows functions plus peer-to-peer network software, Microsoft Mail, Scheduling software, network DDE capabilities, and the MAPI interface at a price of $390 or at an upgrade price of $270.

The hardware/software Starter Kit, which comes complete with two copies of the above software and two thin Ethernet 10BaseT network cards, cabling, T pieces, terminators, and an instruction video and Microsoft screwdriver (set to become the hottest — sorry Daniel — 'coolest' collectable since the see-through Microsoft mouse), is priced at $1400 (base cost), or $960 as an upgrade.

Users can be added to the system one at a time at a price of $700 or $490 (for an upgrade), with a single set of the Starter Kit components listed above.

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IBM PC revamp features 'value' range, new notebook series

New Australian-manufactured 'value' range PCs were the stars of IBM's local Personal Systems division's launch of a new-look personal-computer lineup last month.

The 486-based value PCs, or PS/Vs, are based on the 16-bit IBM AT bus, an architecture that was previously phased out of IBM's range of PS/2s, although in recent times, it has been used in the PS/1 range.

IBM Australia also announced two new PS/1s, a range of new PS/2s and its fault-tolerant PS/2 Server 295. At press time, the company was also on the verge of announcing a beefed-up range of notebook computers, the ThinkPad series.

IBM's new PS/Vs are available in two models, a 25MHz 486SX-based system with 4M of RAM and a 160M hard disk, retailing for around $3723, and a 33MHz 486DX-based model with 8M of RAM and a 210M hard disk costing around $5418.

Both systems are manufactured at IBM's Wangaratta, Victoria, factory and were co-designed by Wangaratta staff and IBM Japan. They are available this month.

Both models come with OS/2 Version 2.00.1 pre-loaded on disk and an IBM mouse. Prices do not include the cost of a monitor, although both systems support Super VGA graphics.

IBM's new PS/1s are aimed at small businesses that want to be able to run their computers straight out of the box. The new entry-level model, a 25MHz 386SX-based system with 2M of RAM, VGA graphics and a 85M hard disk, costs $2295 with a colour monitor. A 20MHz 486SX-based system with 4M of RAM, a 129M hard disk and Super VGA graphics, costs $2995 with a Super VGA colour monitor.

IBM's new range of PS/2s includes four of the 12 new models recently released in the US. New Model 56 SLC2 and 57 SLC2 desktops will replace existing Model 55 systems, which will be phased out over the next few months. Both systems are based on IBM's own 486SLC2 processor, have 8M of RAM and start in price at around $4600 with a 100M hard disk drive.

The new PS/2 Model 76 and 77 will replace existing Model 70 machines. The Model 76 includes a 33MHz 486SX processor and 8M of RAM, and starts at $5650 with a 100M hard disk. The Model 76 features Intel's 33MHz/66MHz 486DX2 chip, and costs $7650 with 8M of RAM and a 210M hard disk drive.

New notebook computers, due for introduction this month, include the ThinkPad 700 series of Micro Channel Architecture machines, based on IBM's 486SLC chip, and the 386SL-based AT-bus ThinkPad 300 series.

Both the 300 and 700 series will be available with a choice of monochrome or active-matrix colour screens, and both can be upgraded from monochrome to colour.

A monochrome ThinkPad 300 with 4M of RAM and an 80M hard drive will sell in the "low $4000" IBM officials said, and a similarly configured colour ThinkPad 700C with a colour display will be priced in the "low $7000s".

Chris Bowes

DOS users can also be networked into the mailing and scheduling facilities of Windows for Workgroups with a MS-DOS Workgroup Connection Kit, which costs $155.

Significant discounts on these prices are offered to Microsoft Communiqué members.

Training has also been addressed with the establishment of technical seminars to run in Australia over the next two months and the commencement in the new year of applications development courses at the Microsoft Institute. Discussions and beta testing have also begun for product courses with third-party training providers, and these are expected to coincide with shipping of the product, which is due to commence this month.

Recommended system capabilities include a 386SX processor or higher running DOS 5.0, 4M of RAM, a 5.25 or 3.5in high-density disk drive, 14.5M of available hard drive memory, a VGA or Super VGA Windows-compatible monitor video card and a Windows-compatible network adaptor card and cabling.

For more information contact Microsoft Australia on (02) 870 2200.

Helen Dancer

Spreadsheets wars move to Windows

Contender Lotus 1-2-3 and newcomer Quattro Pro have stepped into the Windows ring looking for a knockout punch and a chance to dethrone Windows spreadsheet champion Excel.

While Microsoft — whose Excel holds nearly 62 per cent of the Windows market — has opted to watch the two challengers from the ringside for the time being, the fight has begun. Lotus threw the first punch with a $100 price cut. Borland then landed a one-two combination . . . by bundling DOS and Windows together for one price. Lotus has come back off the ropes, dummied with a left, and bundled AmiPro 3.0 with Lotus 1-2-3 for Windows.

Lotus, which has dominated the DOS spreadsheet market but has struggled to gain ground in the Windows environment, cut the suggested retail price for its 1-2-3 for Windows from $895 to $795 in August. Lotus research claims that streets prices for its products average around $200 less than this.

Borland is offering users Win/DOS — two spreadsheets, both its DOS and Windows versions — in one package priced at $750, intending to provide an easy upgrade path for DOS users. As well as providing a choice between operating systems, Borland is also offering users of any other spreadsheet package an upgrade to the Win/DOS bundle for $295.

Borland is considered by users to have a good product, but one that it needs to push if it wants to impact on Excel's dominance. Conversely, many feel that Lotus' Windows release of 1-2-3 was premature, and that this has damaged the product's credibility.

While the fight has just begun between these three spreadsheet makers, users feel that all the products have comparable feature sets and capabilities, and that there is more to a product than a low price. With no one package likely to deliver a knockout blow, the bout will probably be based on points to the company with the best support.

Mike Moeller
Edittech International

Talking Windows now also connects to Unix and DEC

Locally developed Windows communication package, Talking Windows 2.2, has been enhanced with networking features that allows users to maintain multiple communication sessions with multiple host computers.

The enhanced product,

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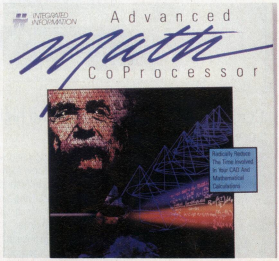
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Compaq unveils its latest low and high-end servers

Compaq tightened its grip on the network server last month with the introduction of its new low-cost ProSignia line and new high-end Systempros equipped with the firm's new TriFlex System Architecture.

At the same time, Compaq revealed that it is readying a multiprocessing Systempro — capable of running four CPUs — which will lift the company's server offerings to new levels of performance.

With its ProSignia line of servers, which start in price at under $6000 for a 33MHz 486-based system with no hard drive, Compaq is hoping to repeat its success in the desktop and notebook markets with its low-cost ProLinea and Contura product lines.

The single-processor ProSignia — which is also available in a 33MHz/66MHz 486DX2 configuration — is designed to compete in price with, and offer more features than, cheaper products that have been eating into Compaq's revenues. Standard with the ProSignia systems is a 32-bit network interface card for Ethernet or Token Ring, as well as Compaq's version of NetWare and the company's Insight Manager software for monitoring the server.

Compaq's new high-end system, the Systempro/XL supports RAID (redundant arrays of inexpensive disks) levels 1, 2, 4, and 5, and offers 16M of 1, 2 and 4-bit error-checking and correcting (ECC) memory for increased reliability.

The XL is the first of a series of servers based on Compaq's TriFlex System Architecture, which features a 64-bit processor bus, 128-bit memory bus and 32-bit Extended Industry Standard Architecture (EISA) expansion bus.

The new Systempro supports two 50MHz 486 CPUs, as well as planned P5 and P6 processors from Intel, and is priced at $19,944 for a system with 16M of ECC RAM and a 550M hard disk.

Back in the lab, Compaq has been running a four-processor Systempro based on the TriFlex architecture, Compaq officials said. When it is released early next year, it will run four 50MHz 486DX or 64-bit P5 processors, they said.

Chris Bowes

Talking Windows Plus, developed by Sydney-based firm Corporate Workgroup Resources (CWR), offers connectivity to a variety of Unix and DEC hosts.

As well as support for TCP/IP and DECnet LAT networking protocols, Talking Windows Plus (TW Plus) also supports a range of terminal-emulation modes. DEC users, for example, can take advantage of a range of VT emulation, with ANSI colour and Tektronix graphics emulations also offered.

TW Plus can also take advantage of Windows Dynamic Data Exchange (DDE) to allow users to cut and paste between sessions and Windows applications such as word processors or spreadsheets.

Talking Windows Plus, which retails for $395 per user, currently supports various socket libraries for TCP/IP, including FTP's PC/TCP, Novell's LAN Workplace for DOS, Wollongong's Win/TCP, Sun's PC-NFS and Microsoft's LAN Manager 2.1. Other libraries can be supported on request, officials said. For DEC users, TW Plus can work with PathWorks and non-PathWorks LAT.

Terminal emulations offered include VT100, VT220, VT320, ANSI, Videotex, Tektronix and Regis Graphics (VT24/VT340), ASCII 80, 132-column mode and Videotex (Prestel), 40 and 80-column mode.

CWR can be reached on (02) 411 4755. Sysgy Computers has been appointed by CWR to service the DEC marketplace. The firm can be contacted on (02) 413 1588.

Chris Bowes

AMD releases new chip that improves speed by 20 per cent

Advanced Micro Devices has launched the fastest 386SX chip ever, a 40MHz version it hopes will become standard in all entry-level boxes.

The new chip, the AM386SX/SXL, is said to deliver a 21 per cent increase in speed over AMD's previous 33MHz 386SX chip. AMD is currently the fifth-largest manufacturer of integrated circuits and microprocessors in the world.

According to AMD officials, the 40MHz chip is already being incorporated into motherboard designs by Singapore-based Wearnes, and interest has been expressed by both AST Research and Digital Equipment.

"Because it is the same price and delivers much improved speed over previously released chips, I anticipate that most of our customers — such as Tandy, Everex, Olivetti and IBM's European division, Ambra — will soon be offering PCs based on this chip," said David Frink, an AMD spokesperson.

PCs based on the new chip are faster than those based around Cyrix's 486SLC chip and comparable to PCs based on Cyrix's 20MHz 486SX chip, Frink said.

According to AMD, PCs using the 386SX 40MHz chip deliver an 8.6mips performance rating compared with 5.9mips for the Cyrix 486SLC-configured systems and 8.9mips for a typical 20MHz 486SX-based PC.

Mike Moeller
Edittech International

Intel to launch new chips for notebook market

Intel is about to launch a plethora of low-powered microprocessors for 486 notebook computers.

The 486SL CPU, set to be released this month, will be the first of 25 new processors that will take advantage of Intel's System Management Mode and its corresponding System Management Interrupt feature for reducing CPU power consumption. These features are currently only found on the 386SL CPU.

According to sources, the new CPUs — with names such as 486DX2, 486DXLP, 486SXLP and 486SX — will include Intel's SMM architecture and other features that were once reserved only for the SL line.

Some of the features include a fully static design which allows a motherboard to stop drawing power between keystrokes and an I/O restart feature that turns peripherals on and off quickly. By incorporating SMM into

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Ipex Centra 2000 Server offers fault-tolerant RAID storage

Melbourne-based clone assembler and systems integrator Ipex has expanded its high-end offerings with the release of the Centra 2000 file server range, which boasts an optional RAID (redundant arrays of inexpensive disks) storage subsystem.

Other differentiating features include multilevel security, multiple cooling systems and the ability to be field upgraded from an entry-level system to a range of 486 processors.

Users are also offered a choice of expansion bus architectures — either Industry Standard Architecture (ISA) or Extended ISA (EISA), according to Ipex technical director Yaron Schwalb.

A 25MHz 486SX-based system with an ISA bus, 32M of RAM and a 1.4G hard drive costs around $18,000, and can be upgraded to run 33MHz, 50MHz 486DX or 33MHz/66MHz 486DX2 processors.

An EISA-based system with a 50MHz 486DX CPU and a 1.68G RAID storage subsystem costs around $37,000. A multiprocessing system with twin motherboards is also available, officials said.

Security features include a lockable outer case and the ability to lock each of the removable disk drives. A PIN padlocking the keyboard, floppy disk or tape drive adds an extra level of security, officials said.

A total of five cooling fans is one of the system's more unusual feat ures, Schwalb said.

"The unit has been built to unusually robust standards," he said. "The additional fans circulate air among all the sub-assemblies and components, which, unlike power supplies in standard PCs, provide long-term support for a heavily populated card cage."

The Centra 2000 RAID storage subsystem offers hot pluggable drive modules, and is fully fault tolerant, Schwalb said.

Ipex can be contacted on (03) 242 5000.

Chris Bowes

the chips, notebooks will be able to run applications that will power down items such as the LCD and hard drive.

Sources added that the chips would be running at 3.3V instead of 5V.

While Intel would not give specifics on the pricing of the 486SL chip, or any of the other chips set to be released next year, sources close to the company said the prices would be very competitive and should be close to the cost of the chips without the power-saving features.

Mike Moeller
Edittech International

Bizarre programs debut at San Diego Computer Fair

Are your next door neighbours aliens? Does your hard drive have water in it? In California — where else? — there are software programs to answer those questions.

Nearly 70 weird, bizarre, and gross software programs competed for the title of 'weirdest software program' at September's first annual San Diego Computer Fair.

And the winners . . . a tie between three programs: a bungee jumping cow that transforms into steaks, hamburgers and sausages as it hits the ground; a program that tells you if your neighbours are aliens by asking users a series of questions; and a program that predicts how many hours a person will spend in a bathroom during his/her lifetime.

"We had some really bizarre, off-the-wall stuff entered in the contest," said Kevin Leap, fair organiser and publisher of *ComputerEdge*, a weekly San Diego trade journal. "A month before the fair, we decided to hold the contest for weird, off-beat programs. I could not believe the number of programs that were entered, given the fact that programmers only had a month to prepare. These programs really don't have any socially redeeming values. To be honest, I have no idea why programmers spend their time on such stuff."

Other programs entered included a close-up picture of a person being shot in the head, a picture of a slug crawling in and out of a person's ears, mouth and nose, a program that writes 'Zen-like' poetry, a program that tries to take your picture by telling you to move 'a little to the left', and a crystal ball program that makes wild predictions about a user's future.

"[We had] a great time, and some of the programs were really weird, including a program that makes your PC burp and another one that makes your hard drive sound like it has water in it and tells the user it needs to be drained," Leap said.

"Next year, we are going to plan the contest a year in advance, and I am sure that we are going to get some great programs," he added.

If you are interested in entering programs for next year's contest or want to know more about the 'weird' programs, fax a message to: Kevin Leap, publisher of *ComputerEdge*, in the US on (619) 573 0205.

Mike Moeller-Edittech International

Hitachi makes waves with RISC chip exceeding 100mips

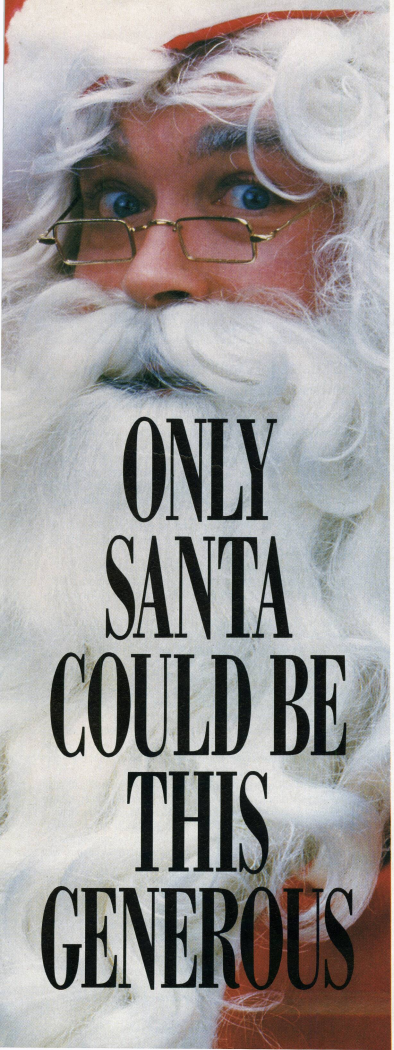
Japanese conglomerate Hitachi is discussing entering the worldwide Unix workstation market with a RISC-based workstation that will exceed 100mips.

The $US62 billion giant that contributes to two per cent of Japan's total Gross National Product, is developing a new workstation, (set for release around the middle of next year) based on Hewlett-Packard's Precision Architecture.

While the workstation will initially be sold only in Japan, Hitachi officials said they are still discussing whether to release it internationally.

"We are in the process of designing a RISC chip that will exceed 100mips, which will be used in a new workstation that we are developing," said Patrick Wilson, a director of communications at Hitachi's corporate headquarters.

Hitachi is one of the original founders of Open Software Foundation (OSF), a foundation created in 1988 by a coalition of vendors to promote software for an open, Unix-computing environment. Recently, Hitachi endorsed a plan by OSF to test and certify that Unix



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Mike Moeller
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NT's release prolonged

Windows NT will remain vapourware into next year after Microsoft announced that it has pushed back the date of NT's release until 1993.

Originally expected to debut next month, NT product manager Mike Nash said the new operating system will not be released until "the early portion of the first quarter of 1993."

However, his boss, Bill Gates, last month told a California conference the 32-bit operating system that will seamlessly integrate DOS and Windows, while adding network functionality, would not be shipped until the second quarter of 1993.

And sources close to Microsoft, who wanted to remain anonymous, said that the advanced software will not be ready for release until probably the third quarter of next year at the earliest.

According to Nash, the reason for the delay was to make sure the product was complete before shipping, and was not released just to try and meet a deadline. Microsoft began sending out 18,000 kits of NT to software developers in July. Nash said that the beta testing, orginally set to start by the beginning of September, commenced around the middle of October. He added the beta version of NT would be sent to approximately 10,000 corporate users.

"We are waiting to get feedback from the beta users before we set a firm data for the commercial release of NT," Nash said.

However, industry observers believed that the delay signified that Microsoft was having trouble building the operating system from the ground up, and that perhaps the construction of a complex operating system may be over the heads of Microsoft's engineers.

"This is a company that took eight years to bring out Windows — and while it works, it is not yet perfect," said Rikki Kirzner, a senior analyst at research firm Dataquest.
Mike Moeller
Edittech International

Movie promotions turn to hi-tech

Instead of the usual elaborate party, one Hollywood director is promoting his new movie on the CompuServe online service.

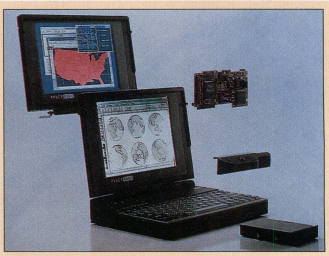
Phil Alden Robinson, a CompuServe subscriber for the past eight years, is director of *Sneakers*, a film about computer hackers that includes a fabled cast of actors such as Robert Redford, Sidney Poitier and Dan Akroyd, took the hi-tech approach to whip up support for his movie.

CompuServe members can fire away questions to the director or some of the movie's writers and producers. Robinson, as well as several of the movie executives, sign on once a day and send back replies for the rest of the world to read.

"This has been a tremendously successful approach to promoting the movie," said David Beurfeind, director of national promotions at Universal. "This is the first time that this approach has been taken, and users are loving it. They are able to get straight answers about the movie right from the director, which is really rare for the general public."

Not only can CompuServe subscribers 'chat' with the film's director and writers, but CompuServe has also developed a game called 'Break the Code', in which winners can get a 'Sneak into Hollywood' junket, or receive the jacket Robert Redford wore in the film.

The movie's story (see Newsprint, October *APC*, page 8) is about hi-tech security experts who develop a 'black box' that can crack the code of the world's most elaborate computer systems, unlocking national and international secrets.
Mike Moeller
Edittech International



AST notebooks for the next generation

Limitless computing is the theme for AST's release of new notebook computers. Full upgradability, removable hard drives, longer battery life and PCMCIA slots are the hallmarks of the newly announced 386SL notebook range, offering a machine that AST officials claim will continue to meet the needs of the most demanding user.

Differentiated from the existing family of Premium Exec computers with the name Power Exec, the notebook offers intelligent power management which the company estimates will provide a battery life of up to six and a half hours of continuous use, as well as a recharging time of 90 minutes (resting).

The notebook has a processor that is upgradable to a 32-bit/3V 486 processor and a screen that is upgradable to ultra STN colour or, further down the track, TFT active matrix colour.

The two industry standard PCMCIA slots provide expansion capabilities, and their inclusion signals a trend that vendors are at last becoming serious about providing the flexibility that PCMCIA technology offers.

Removable hard drives offer the dual functions of security and minimal disruption to work processes, as the hard drive can simply be attached via the floppy drive of another computer for the information contained on it to be used in that other machine.

Standard monochrome models are priced as follows: Power Exec 3/25SL Model 63 (60M HDD) costs $3990; and the Power Exec 3/25SL Model 123W (including a 120M hard disk drive, and bundled with Windows 3.1 and AST SmartPoint trackball), sells for $4590.

Colour models range from $5690 for the Model 83, (which comes with an 80M hard drive), to $6390 for the Model 163/W, (which features a 160M hard drive and comes bundled with Windows 3.1 and the SmartPoint trackball). All models are supplied with DOS 5.0.

Also available with these new notebooks are the PowerStation and EasyPort quick-connect port replicators, which offer easier interface with peripherals. The PowerStation offers ergonomic design that positions the keyboard at wrist level for more comfortable use, as well as keylock security. Design also includes one full-size and one half-size ISA slot to accommodate standard 16-bit ISA boards, as well as other options, such as modems and networking cards.

The PowerStation retails for $700 and Easy Port costs $140. For more information, telephone AST on (02) 415 5400.
Helen Dancer

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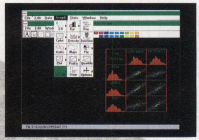
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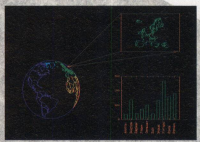
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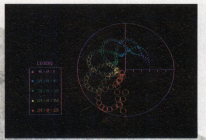
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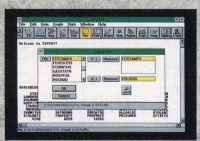
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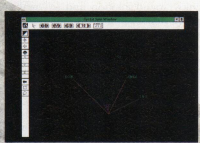












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Windows on a LAN? The solution is clear

Australian distributor Clear Technology has announced the commercial availabilitiy of a product designed inhouse to cope with the difficulties of managing Windows on a LAN.

The product sports the acronym SPOC, Single Point of Control, which accurately describes its ability to reduce the time the LAN manager must spend on the frequently repetitive and frustrating tasks of adding and removing users, and changing their access levels and applications use.

Clear has established a reputation as a systems integrator and has been conferred master distributor status from Unisys, and Platinum reseller status from Novell. The company specialises in implementing working solutions — and that includes fixing the problems well after the system has been installed. Clear Technology also has a hotline support facility that registers the problems being faced by users, and Clear undertakes to resolve the problems, either remotely or in person.

"We had very clear insight into the trends of problems in managing Windows on a LAN because the database of problems logged showed strong repetition of certain aspects of LAN management. SPOC is a direct result of assessing how to solve not only the problem, but the possibility of it recurring, to those users or in new installations," Jobson said.

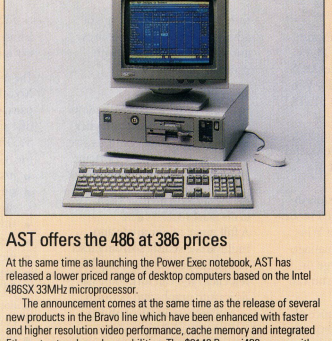
SPOC is not a shrinkwrapped solution, and requires customising to the requirements of the particular site. Properly configured, however, it will significantly reduce the time the LAN manager must spend installing system and applications software on new machines and for new users, as well as granting new or temporary acess to extra applications or Windows features.

"We found that many of the problems on the LAN were from users with superficial understanding, causing breakdowns without even realising what they were doing," Jobson said. "SPOC removes from each user profile the functions they will not need, thus minimising the risk of them causing problems inadvertently.

"When you consider that 90 per cent of LAN administration time is spent on finding the problem, and 10 per cent is spent on fixing it, having a resource that will tell you where the problem lies offers significant benefits," he added.

The cost of SPOC ranges from $5000 for a five-user site licence to $25,000 for a 250-user site licence.

For more information contact Clear Technology on (02) 310 3077.



AST offers the 486 at 386 prices

At the same time as launching the Power Exec notebook, AST has released a lower priced range of desktop computers based on the Intel 486SX 33MHz microprocessor.

The announcement comes at the same time as the release of several new products in the Bravo line which have been enhanced with faster and higher resolution video performance, cache memory and integrated Ethernet network-ready capabilities. The $2140 Bravo i486 comes with 2M or RAM, a 3.5in floppy drive and DOS 5.0.

The Power Premium range has three offerings in the i486 range, all at the 486SX, 33MHz level. These are the $3500 Model 3V, with 8K of internal memory cache, 4M of RAM, a 3.5in floppy drive, an integrated Premium VGA, AST FlashBIOS, EISA and 1M of video RAM. The Model 83 includes an 80M hard disk drive on top of the previous specs and has a list price of $3900; the Model 123W includes a 210M hard disk drive and comes bundled with factory-installed DOS 5.0 and Windows 3.1, Microsoft mouse and mousepad, as well as the other features. This model has a list price of $4800.

At the top of the range is a Power Premium 4/66d i486 DX2 66MHz machine. The Model 123W comes bundled with DOS 5.0, Windows 3.1, a Microsoft mouse and mousepad, and features 8M of RAM, a 210M hard disk drive, a 3.5in 1.44M floppy disk drive, integrated Premium VGA, AST FlashBIOS, EISA and 1M of video RAM. This model carries a list price of $6300.

Helen Dancer

Microsoft makes EIS out of applications

Microsoft intends to become a player in what it calls the 'enterprise-wide information systems' (EIS) marketplace when it launches a package called EIS Pack this month.

The product will contain an 'EIS Builder' function to aid users in customising the Excel spreadsheet program to provide graphical query and analysis. It will also exchange data between external databases and applications.

"Rather than building a dedicated mainframe product, Microsoft is building an EIS out of applications," said a source familiar with the upcoming product. There are many advantages to this approach because the EIS Builder add-in provides the user with the functionality of EIS and Excel more easily than if they had to customise it, he said. It will also make advanced analytical charting and text-formatting functions more easy to use.

"When you deliver a system like that to the end user, you automatically get the full capability of Excel to go forward," said the source.

The product will be marketed to the department level of corporate customers who want ease in building EIS without having to deal with macros. Many of these potential customers are already using applications to build their EIS systems.

Microsoft's EIS Builder will become the standard for this type of EIS system, believes Steve Garfein, president of RPM System, a business solutions consulting firm based in the US. "The reason an end user will want something like this is because it will integrate a number of applications," he said.

The dialogue boxes provided in the product will contain code to connect these applications together so that users can more easily cross programs, he said. "It really helps manage multiple views of data in Excel," he said.

Although Garfein does not know the cost of the EIS, he believes it will be reasonably priced. Microsoft would not comment on price at press time: the product is expected to be available this month.

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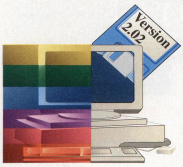
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Ornella de Rubeis compiles a rundown of the latest product upgrades.

A direct response to requests

Claimed to be designed with users' requests in mind, PC Tools 8.0 from Central Point Software includes a suite of new features to support increased network operation, growing memory demands and portable computing needs, as well as providing protection against acute security risks posed by the spread of computer viruses.

Some of the new features include: a new Desktop that provides a consistent, Windows-like environment through which users can access all of their applications and files, as well as PC Tools features; Central Point Anti-Virus (CPAV), which now detects more than 1300 viruses, including boot sector, polymorphic (self-modifying) and stealth (self-concealing) viruses; RAMBoost, a new memory optimiser, which improves the memory utilisation of existing memory managers by automatically loading device drivers and TSRs in upper memory, thus expanding the space available in conventional memory; and Central Point Backup, which now offers a broad support for tape backup devices, including support for SCSI tape drives, such as DAT and 8mm drives.

For portable PC users, Central Point Commute 2.0 makes it possible to run remote DOS or Windows sessions via modem without delays for screen updates, and DriveMap makes it easy to move files between laptop and desktop computers.

PC Tools 8.0 runs on IBM-compatibles and PS/2 systems running DOS 3.3 or higher, and 640K of RAM.

Distributor:
Central Point Software,
(02) 555 7473
Price:
$270

Print Manager becomes redundant

PrintCache 3.0 is a program that automatically replaces the 'less efficient' Windows Print Manager.

According to officials, PrintCache 3.0 halves the average printing time for documents in Windows and betters that time for DOS-based packages. In addition, it installs easily to provide a disk or EMS/XMS buffer of up to 99M to spool printed jobs and free up the keyboard almost instantly.

PrintCache 3.0 is Windows 3.1 and DOS-compatible.

Distributor:
Logo Distribution Services,
(02) 905 1844
Price:
$199

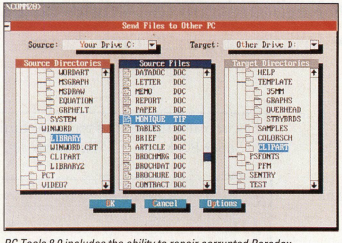
For the budding musician

Midisoft's latest release of its music software program, Studio for Windows 3.04, is now compatible with Windows 3.1 and supports many popular sound cards, such as the Sound Blaster range, due to the enhanced driver support for audio and MIDI devices found in Version 3.1.

Because it instantly displays standard music notation in real time during recording, editing and playback, Studio for Windows is ideal for users looking for software that will allow them to easily compose and learn music, play along with existing tunes, or edit music for multimedia programs. Even for people with few (if any) skills, it turns a PC with a sound card into an authoring tool ideal for adding sounds to presentations and multimedia applications.

Midisoft Studio for Windows requires an IBM PC or compatible running Windows 3.0 or later, a mouse, and a sound card with an integral MIDI interface. The program is also compatible with all MIDI-equipped electronic instruments, as well as MIDI devices supported by Windows 3.1.

Distributor:
Computamart, (02) 906 8887
Price:
$399



PC Tools 8.0 includes the ability to repair corrupted Paradox, R:Base, dBASE, Quattro Pro, Excel, Lotus 1-2-3 and Symphony files

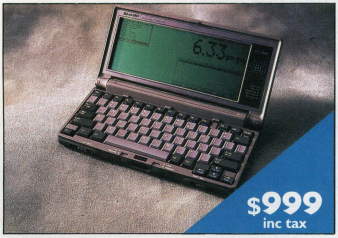
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- The Norton AntiVirus 2.1 for DOS

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The latest in all-round accounting

New graphs, faster data entry, new financial planning calculators and a pop-up calendar — that's the latest with Quicken 6.0.

Designed for home and business use, the Quicken financial package uses single-entry accounting and familiar terms such as 'payment' and 'deposit'. It also tracks all types of transactions, such as cheques, savings, mutual funds, mortgages and liabilities.

Version 6.0 features new Quicken graphs with which financial trends and allocations can be viewed at a glance in a variety of forms. The new amortisation tracking function allows users to track variable-rate and fixed-rate loans; it automatically calculates principal and interest, and monitors prepayments and loans fees.

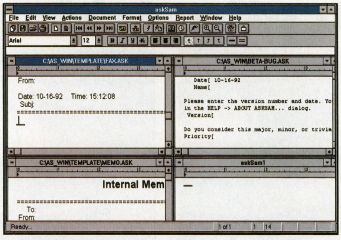
Also provided is Quickfill, which automatically completes transaction information, dramatically reducing data entry and eliminating the need to enter the same transaction twice.

Distributor:
Reckon Software, (02) 550 2666
Price:
$129

A warehouse of information in Windows

askSam Systems has released a Windows verison of its information manager, askSam, which combines word processing, text retrieval and database functions, allowing users to manage structured and unstructured information.

In the Windows version, drop-down menus and dialogue boxes allow an absolute novice to manage information, while askSam's icon bar and keyboard shortcuts provide instant access to the most important word processing and database functions. The program's command line allows users to enter requests and locate information without having to navigate through menus.



askSam for Windows — making Windows information management easy

askSam for Windows' word processing capabilities now include support for multiple fonts, as well as variable tab and margin settings. Documents can also contain graphics that can be resized, copied or moved.

Managing information in this version requires no structure. Like a text-retrieval program, askSam searches through documents for specific words or phrases. If, however, data is structured, askSam acts like a database, outputting fields, sorting data, performing arithmetic and creating reports. Combining these capabilities, users can interweave structured data with free-form text to manage nearly any kind of information.

In addition, data from the present DOS version can be searched and read by askSam for Windows without conversion.

Distributor:
Infotastic, (02) 337 5126
Price:
$599

Tracker: networked for the corporate user

Softcode has released a network version of its personal-contact management system, Tracker Professional VI.

Called Tracker Network, it prevents more than one person inputting data into a client file at any one time. Other features include an E-mail Message Handling Systems (MHS) gateway, which allows LAN-WAN access to users on an individual, status or group basis; group TO-DO and Group Appointments, enabling quick organisation of joint departments' activities; password and Supervisor Security, which allows discretional access to database files; and system-wide Macros, enabling 'instant audits' of anything from departmental financial status to analysis of client contacts.

According to officials, "Whole departments, even multiple departments, can simultaneously plug into information that's vital to the swift operation of many tasks."

Distributor:
Sourceware, (02) 427 7999
Price:
$1300, (two-user pack); $199 for each additional user

Designing complex corporate charts

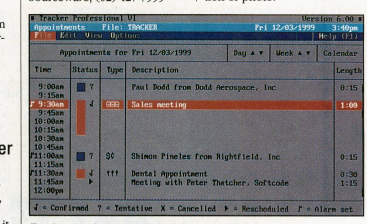
Claimed to be 'the best way to get a complex organisation down on paper', Windows OrgChart 2.0 from Micrografx is an organisation charting software which satisfies the demands of both management and administrative-level users who want to take full advantage of their high-speed, graphics-based PCs.

New features include a fit-to-play capability that allows the reduction of large organisational charts onto one page, including a 'best-fit' specification that automatically resizes all fonts.

With Windows OrgChart 2.0, automatic line drawing and box alignment make creating and editing organisational charts faster and easier than with conventional computer drawing programs. Users simply point and click to add, delete or promote personnel.

Starting with a single top box, users can add either assistants or subordinates. Each manager position has an icon that allows the addition of mid-level managers.

Connecting lines are rerouted automatically when moving boxes. Users can also link detailed notes or photos to any position, and point and click to display that information or photo.



Tracker now has group-scheduling capabilities

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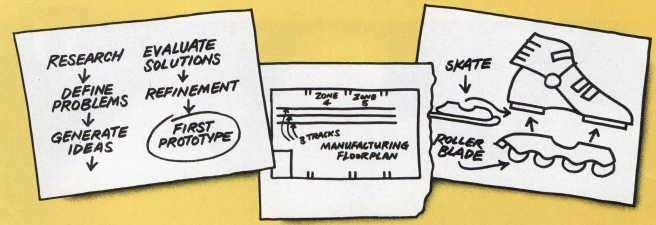
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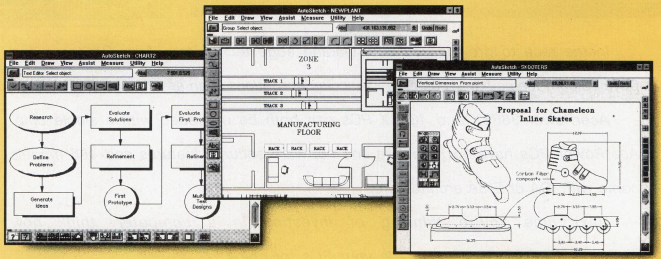
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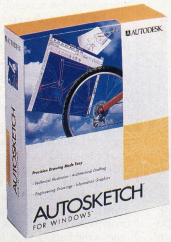
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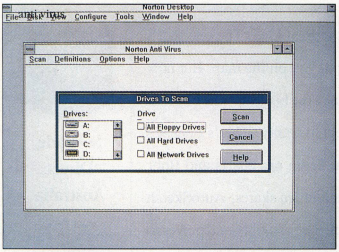
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The Norton AntiVirus 2.1: scanning speed has been improved by 40 per cent, and systems can be scanned for viruses in either DOS or Windows

Numerous charting configrations will give Windows OrgChart users a variety of ways to display a company's organisational layout. The program can output to any Windows-device format, including slides, and files can be exported to other applications.

Other new features include an option for co-managers or multiple top managers to be depicted at the same level; and the ability to implement and save changes instantly.

Distributor:
Micrografx Australia, (02) 415 2643
Price:
$250; upgrades

Up-to-date virus protection

In an effort to improve data integrity and safe computing, Symantec has released The Norton AntiVirus 2.1 for DOS and Windows.

New features include detection of more than 1400 known viruses, increased network functionality, detection of all the US-based NCSA (National Computer Security Association) Virus Library Mutation Engine viruses, Windows Background Scanning and a Windows Scheduler. Version 2.1 includes complete DOS and Windows applications in one integrated package, providing visual and audible virus alert messages in any DOS or Windows application.

According to officials, scanning speed is now up to 40 per cent faster, and systems can be scanned for viruses in either DOS or Windows. Norton AnitVirus 2.1 includes a new Windows scheduling program that allows attended or unattended virus scans at any time in the background, using as little as 1.5K of RAM.
Distributor:
Symantec, (02) 879 6577
Price:
$219

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NEC	83,83M,84
NEC	BFU35
PANASONIC	CR 501S, CR 501B
PANASONIC	LKMC501S/B
PIONEER (DOS/WIN & OS/2)	DRM-600
SONY	CDU-541
TEXEL	DM-3020/5020
TEXEL	DM-3024/5024
TOSHIBA	XM2200A
TOSHIBA	XR3301

JUKEBOXES
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HEWLETT PACKARD	C1710 A/M
HEWLETT PACKARD	C1713 A/M
HEWLETT PACKARD	C1714 A/M
HEWLETT PACKARD	C1715 A/M
IDE	PLS7000
IDE	PLS7100
IDE	MLS LG-5
LMSI	LF511
LMSI	LF512
LMSI	LF521
LMSI	LF522
MITSUBISHI	MW5G1
PANASONIC	LFJ7000
PANASONIC	LFJ5000
REFLECTION SYSTEMS	RF10J
REFLECTION SYSTEMS	RF11JM
REFLECTION SYSTEMS	RF47J
REFLECTION SYSTEMS	RF50JM
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CIPHER	ST150
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EXABYTE	EXB 8500 8 MM
GIGATREND	MULTIDAT
HEWLETT PACKARD	35470 A DAT
HEWLETT PACKARD	35480 A DAT
JVC	XM-5544ZES DAT
MAYNARD	1300 DAT
4 BYTE	RB-100 DAT
SANKYO	CP-150 SE
SANKYO	CP-525 SE
SANKYO	ST-150I/X
SANKYO	ST-525I/X
SONY	SDT 2000
TALLGRASS	FS500
TALLGRASS	FS1000
TALLGRASS	FS4000 ES
TANDBERG	TDC 3660
TANDBERG	TDC 3820
TEAC AMERICA	MT-2ST/N50-75
TEAC AMERICA	MT-2ST/F50 + B
TEAC AMERICA	MT-01N
TECMAR	QT 1000
TECMAR	QT 250 ES
TECMAR	QT 525 ES
TECMAR	DATAVAULT DAT
WANGDAT	1300 XL DAT
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HEWLETT PACKARD * *	C1711
IBM	3510
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MAGSTORE	MEGABOX MINI 128
MAGSTORE	MEGABOX MINI 256
MAXOPTICS *	TAHITI 1
MAXOPTICS	TAHITI 2
MITSUBISHI	ME-3U1-M21
MITSUBISHI	ME-5U1-M21
MOST	RMS-128E
PANASONIC	LF3000
PANASONIC	LF3004
PANASONIC (DOS/WIN & OS/2)	LF9000
REFLECTION SYSTEMS	RF-3010
RICOH	RO-3010E
RICOH	RS-3100E
RICOH* (DOS/WIN)	RO-5030E
RICOH	RO-5031E
RICOH	RO-5030EII
RICOH	RS-9200E
RICOH	RS-9200EII
RICOH	RS-9200EX
SHARP** (DOS/WIN & OS/2)	5.25 M/O
SONY	SMO-S501
SONY	SMO-S350
TEAC	OD-3000-30

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LMSI	LD520
MAGSTORE	MEGABOX LF7010E
MAGSTORE	MEGABOX DES7001
PANASONIC	LF7010
PANASONIC	LF7014
PIONEER	DE-7001
REFLECTION SYSTEMS	RF7010
SONY	SMO-E511

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MITSUBISHI	MW5U1-U11
PANASONIC	LF5000
PANASONIC	LF5010
PANASONIC	LF5014
REFLECTION SYSTEMS	RF7010
PIONEER	DD-5001
PIONEER	DD-5101
RICOH	RS-9100H
RICOH	RS9200F
SONY *	WDC-6.5GB
TOSHIBA *	WM-5070
TOSHIBA *	WM-5050

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LEADING EDGE	N3SL25
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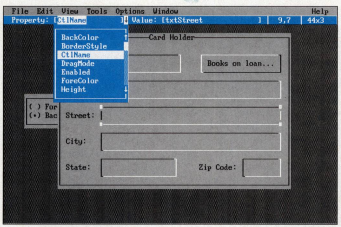
Microsoft Windows Sound System ➤ Page 30
Fractal Painter paint program ➤ Page 32
Philips CDD 521 Compact Disk Recorder ➤ Page 34
MapInfo for Windows ➤ Page 36
XTree for Windows ➤ Page 36
FaxMaster fax package for Windows ➤ Page 40

Visual Basic for DOS: professional edition

Visual Basic for DOS is a DOS-based cousin of Microsoft's impressive Visual Basic. Both Visual Basics are forms-based, object-oriented development environments. They allow you to perform most of the interface design for customised applications without resorting to code and, where necessary, associate familiar basic code with screen objects.

Compatibility between Windows and DOS versions is limited. To create applications for DOS and Windows, you need to develop a DOS version first, using a restricted set of options, then convert to Windows with a combination of automatic and manual methods.

Visual Basic for DOS is aimed at addressing the needs of those who want to avoid the overhead of Windows but still want to develop applications using a screen-painting, point-and-click approach. Because it uses text mode, Visual Basic for DOS has one great advantage over the Windows counterpart: screen refreshes are very fast. For users who want to offer some graphics, Visual Basic for DOS provides useful graphics tools. These require a graphics-mode switch, so you can't have your screen forms and graphics onscreen at the same time. The program provides graphics primitives and a comprehensive chart library so you can develop graphics routines very quickly.



The forms tool allows you to create forms with a variety of objects. Each object has a unique set of properties which can be set to a wide range of values

Visual Basic for DOS is easy to install. Like many applications these days, it's greedy; it takes about 11M of disk space. The installation ends with the option of a tutorial, which provides a thorough introduction to the software.

Like its Windows cousin, Visual Basic for DOS is, as computer scientists say, non-trivial. You can use it for creating involved, complex applications, but to do so requires mastery of a complex, powerful system. You can, however, get small applications up and running very quickly. A 'Hello World' program, displaying a screen form with buttons to display the traditional global greeting in a choice of four languages, takes five minutes to write, and seconds to compile.

You can run programs from the development environment through the Visual Basic for DOS interpreter, or you can compile them as standalone programs or dependent modules that require the Visual Basic for DOS runtime module to operate. Standalone programs can be distributed freely. The Hello World program uses 132K as a standalone program, but only 6K as a dependent module. Programs run very quickly from the interpreter, and even more quickly when compiled.

Visual Basic for DOS is quite memory-hungry. You need to run EMM386.EXE or the equivalent to provide extra expanded memory. This was necessary to run the chart demonstration module and the database demonstration from the development environment. That may mean changing your configuration and having a special configuration for the program. It can also mean it isn't entirely seamless running in a DOS box from Windows; but then, what is the Windows version for?

To use Visual Basic for DOS effectively, you need to become familiar with programming with an event-driven, object-oriented paradigm. In many ways, this is a superior way to program, but it can also be annoying trying to find all those scattered bits of code associated with all the objects. Visual Basic for DOS helps by allowing you to print out a file which combines all the code for an application.

One great feature is the ISAM database system that comes as part of the Professional Edition. It's a fast database system that comes with a very simple programmer interface and offers only a few commands. The demonstration database system provides a good example of a couple of linked databases with buttons to pop between them. The database applications require a pre-loaded TSR to run; it's

AT A GLANCE

Visual Basic for DOS

Distributor: Microsoft
Telephone: (02) 870 2100
Price: $295
Requires: XT or higher, 640K of memory, 12M of hard disk space, MS-DOS 3.0 or higher
In short: Visual Basic for DOS is aimed at users who want to avoid the overhead of Windows but still want to develop applications using a screen-painting, point-and-click approach.

not a terribly tidy way of doing things, but that's DOS for you. If you want Dynamic Loading Libraries, then use Windows.

You can create very attractive forms, all constructed from the DOS character set. The borders of objects are produced in two colours, giving you a clever, shadowed-embossed effect. The system is actually designed for colour displays, and you need to use extra code to make your forms legible on mono displays.

A clipboard for cutting and pasting between forms in your applications is included.

Visual Basic for DOS is an excellent system, with facilities for creating attractive applications. You'll probably see it surface as a front-end prototyper, linking with C or Pascal code, and, as such, it's guaranteed to make a lot of programmers' lives easier.

Neale Morison

Microsoft Windows Sound System: a late but worthwhile entry to multimedia

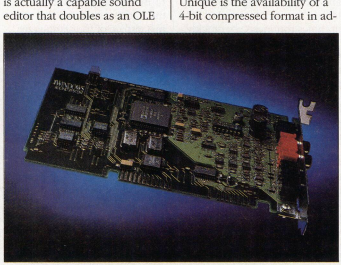
Microsoft, which legitimised the 'serious' business use of PC sound boards with the release of Windows 3.1 and the Multimedia Extensions, has now decided to carve itself a slice of the sound-board pie. The Microsoft Windows Sound System is a windy name for a small and sparsely populated board. On the surface, this board seems to come up short by virtue of the things it doesn't do: you'll find no CD-ROM controller, no Sound Blaster or AdLib compatibility, no external MIDI port, and no big bundle of standard software. The Windows Sound System is, however, a moderately priced board bundled with unique, useful software tools.

Of all the sound boards I've looked at, this one is the easiest to install. A single jumper on the board allowed me to select a port address. When I fired up the Windows-based setup program from the installation floppy disk, a dialogue box popped up to tell me that the board's interrupt had been automatically reconfigured because of a conflict. That's how I like things to work.

Once the board is in, making the back panel connections is a breeze. In keeping with Microsoft's current icon madness, the ports at the rear of the board are labelled with symbols. It has 12.5in stereo jacks for a microphone (included), headphones (also included) and line input (for external devices such as tape recorders). The headphone jack doubles as a line or speaker output, and Microsoft adds twin RCA line-output jacks for direct connection to speakers or some devices' line input. Once the board is installed, everything about it is software controlled.

The flagship application bundled with the board is called Quick Recorder. The name is a little deceptive; this is actually a capable sound editor that doubles as an OLE server. Quick Recorder employs an interface trick I haven't seen from Microsoft before: normal and expanded interface views. In normal view, only the minimum required controls and feedback are presented in a compact window. You can record, play, load and save sound files, but you can't edit them. Expanded view brings up a more complex interface, with full editing and effects capabilities.

The digital audio section of the Windows Sound System records and plays digital audio files at a maximum rate of 44.1kHz in 16-bit stereo. Unique is the availability of a 4-bit compressed format in addition to the 8 and 16-bit formats. The compressed format can even be used at the 44.1kHz rate to reduce space requirements to the equivalent of those for 22kHz audio. I found no significant difference between 4-bit compressed and 8-bit uncompressed audio digitised at the same rate.



The Microsoft Windows Sound System is easy to install and provides superb digital audio quality

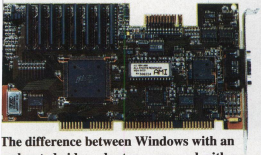
The Sound System board sounds wonderful, and in my tests, it recorded and produced clean, undistorted audio at the 44.1kHz rate in 4, 8 and 16-bit resolutions. The lower rates were less impressive, as you'd expect, but passable.

Even though there are no external MIDI connections, the Windows Sound System includes a Yamaha OPL3 four-operator FM synthesiser. FM is the most prevalent synthesiser in audio boards, but it's a bit of a mismatch here: with the board capable of reproducing such high-quality digital audio, I wonder why Microsoft chose such a cheap-sounding synthesiser chip (most of Microsoft's competitors made the same mistake). Don't expect great-sounding music from this board.

The Windows Sound System includes a voice-recognition module. A Windows application sits in the background and listens to the microphone, waiting for

he original SuperQube
ideo accelerator

sed on the S3 86C911 graphics accelerator chip, it frees the
'U from specific graphic operations like bit block transfers,
e drawing, area filling, image transfers and raster operations
ile also offering hardware cursor support. This dramatically
proves the performance of Windows and CAD applications.



The difference between Windows with an ccelerated video adapter compared with a ypical VGA or SuperVGA adapter is striking! . improvements by a factor of 5 or 10 are not ncommon under Windows. That's like taking 20 MHz 386 and speeding it up to 100 or 00 MHz. On-screen, you can really see the ifference."

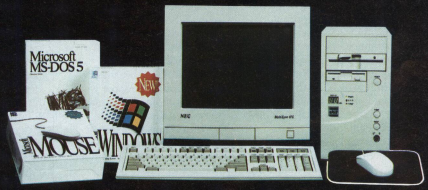
C Magazine, March 17, 1992

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voice commands. Each command set links command words and phrases with Windows keystroke macros. The idea is that you can run your computer, to a degree, by talking to it. Want to find out how much memory you have available? Just say 'About Program Manager' into the microphone, and up it pops.

Everything is user-customisable, but a standard configuration is included that supposedly recognises a limited number of commands without requiring training for a particular user's voice.

The prerelease version of the Sound System I used required training before it would perform anything, but after I learned to use the same inflection every time I spoke, it worked some of the time. Perhaps this will improve in the shipping version.

Tom Yager

AT A GLANCE

Microsoft Windows Sound System

Distributor:	Microsoft
Telephone:	(02) 870 2100
Price:	Microsoft Windows Sound System $425; bundled with Windows 3.1, $525
In short:	Its ease of installation, excellent software and superb digital audio quality make it a worthwhile, though late, entry in the Windows sound-card race.

Fractal Painter: a classic artist's delight

Artists have been using and experimenting with computer painting, drawing, authoring and other software programs, producing commercial art, computer graphics, animation, video, and even music, for years. But in the traditional sense, computers have had little impact on classic art.

The problem is partly due to the small number of accomplished traditional artists willing and able to make the transition to the computer medium, as well as the fact that much of the computer art produced today lacks a broad range of classic effects and depth, which, up to now, could only be easily achieved by using traditional materials and techniques.

Fractal Painter hopes to make this transition faster for traditional artists by allowing experienced computer users to utilise the tools of the traditional trade, without ever leaving their desktops.

Fractal Painter delivers this power by giving the computer user a set of virtual, real-world tools. To quote the manual: 'With Fractal Painter, the eye actually sees the striated surface of oil paint, the gossamer delicacy of watercolour, the nubby richness of charcoal and the lush complexion of pastels.'

The package also offers many other types of 'brushes', such as coloured pencils, felt pens, crayons, chalk and even an airbrush.

In use, these brushes behave in much the same way on the computer screen as they do in the real world.

Users can select from a range of rendering surfaces, including canvas, Bainbridge board and watercolour papers. One of the advantages of using a computer over traditional materials is that you can vary the paper texture and brush types at any time, allowing you to mix any number of brush and paper types in a single painting. For example, you may wish to create a classic-looking oil painting for an advertising campaign that includes certain printed information. You could choose to create the oil painting using Painter and then import the picture into your desktop publishing system. Another option would be to add the printed information to the painting itself by using Painter's calligraphy tools.

Fractal Painter works much the same way as any other Windows-based painting package. The user selects the size and type of working surface, and then uses a mouse or graphics tablet to create the painting. A user can select virtual brushes, paints, inks and brush/stylus techniques from various tool boxes, select windows and icons.

One of the most important reasons for using a computer to create works of art is based on the ease of editing brushstrokes or entire images. You can tell the computer to take back a stroke if you make a mistake, or you can continue to emulate the real-world and correct the problem by using more traditional techniques such as applying additional white or coloured paints, water, or even erasers (which can rub out oil paint just as easily as a graphite pencil).



Fractal Painter gives users a set of virtual, real-world tools. With Fractal Painter users can even reproduce a photo in the style of Van Gogh

But remember, virtual tools mimic their real-world counterparts — using water on watercolours will not simply remove colour, it will also wash colours away, mixing them with other colours and leaving smudges.

On top of the real-world aspects of the package, Fractal Painter is also equipped with the advanced computer painting tools found in other Windows painting programs.

Painter has a very flexible fill tool, gradient effects, fades, cut-and-paste, colour mixing, and more. Painter is compatible with the most popular file formats — BMP,

AT A GLANCE

Fractal Painter

Distributor:	Allaw
Telephone:	(02) 415 9111
Price:	$520
Requires:	A 386 or better, 6M of memory, Super VGA graphics resolution, Microsoft Windows 3.x and a mouse.
In short:	Finally, a paint program arrives for real artists. Fractal Painter will generate printed material which looks like hand-created art. And best of all, you don't have to be an artist or a computer expert to use it.

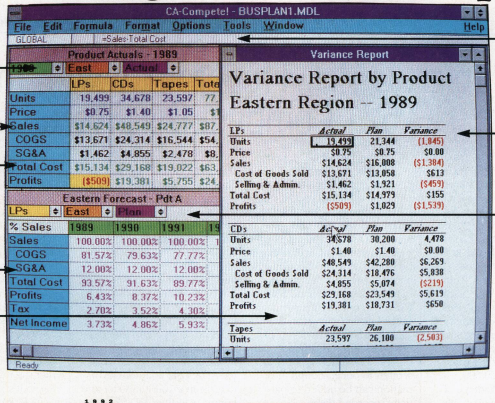
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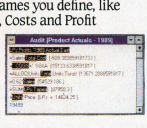
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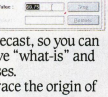
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Perhaps the most impressive feature of Fractal Painter is its ability to look at an image and then reproduce the image using traditional tools. For example, you may have a scanned colour photograph of a country town. Painter can read this file into memory and then reproduce the photograph in oil paint on canvas, paper with lead pencils, or a board with coloured chalk. Painter could even reproduce your photo in the style of Van Gogh and Seurat. Better still, why not create your own styles and save them on hard disk!

As you can imagine, Fractal Painter is a bit more internally complex than the printing program allows, and hence requires a highly configured system. I would recommend a 486-based PC with 8M of memory and a 17in monitor. The program can be operated with a mouse, though to fully utilise the power of this package, a pressure-sensitive graphics tablet is highly recommended.

The package is supplied on both a 3.5in and 5.25in floppy disk, and comes with a brief but effective user manual. It is suitable for business professionals wishing to add flair to presentation, designers who need to draft concepts quickly, artists wishing to enter the world of computer graphics/art without sacrificing valuable experience and techniques, or anyone who wishes to turn existing scanned material into works of art.

Paul Paradigm

Affordable CD-ROM recordings with the Philips CDD 521 Compact Disc Recorder

Looking more like a piece of home stereo equipment than a computer peripheral, the Philips CDD 521 Compact Disc Recorder is the first economically viable CD-ROM recorder for small-business users. Its list price of $12,000 includes software, one blank disk and a SCSI adaptor; this undercuts the price of the first generation of recorders, such as those from Sony and Yamaha, which only a year ago cost over $US20,000.

The primary advantage of the CDD 521 is its reasonable price and painless operation. It is ideal for businesses that need to have the ability to make a couple of CD-ROM disks quickly without resorting to a rack full of equipment or expensive service providers.

Using a standard CD drawer rather than a finger-pinching CD-ROM caddy, the CDD 521 accepts 5 and 3in disks, and will play and record CD-ROM disks. Approximately 600M of data can be stored on a 5in disk and about 200M on a 3in disk. A blank disk costs around $50. Unlike competing magneto-optical drives, however, the CDD 521 is not a true rewritable optical storage device. The disks can only be written to once, though information can be added to partially recorded disks.

The CDD 521 conforms to the current Orange Book for recordable CD devices and can potentially be used to record other CD formats, including CD audio (Red Book), CD-ROM XA (Extended Architecture), CD-I (Interactive, Green Book) and Kodak's Photo CD format. In the configuration we tested, the CDD 521 is limited to CD-ROM use only. Unlike standard CD-ROM players, it cannot play back audio compact disks, and the other CD formats cannot be recorded without additional hardware and software. Connecting the CDD 521 to a PC is no more complicated than hooking up a peripheral. It comes with a SCSI-2 Adaptec AHA 1242 adaptor card that fits in a 16-bit ISA slot and connects to the CDD 521. Installing the CDwrite software is a matter of creating two directories, copying the software to your hard disk, and inserting software driver statements in your CONFIG.SYS and AUTOEXEC.BAT files.



Recording studio: the Philips CDD 521

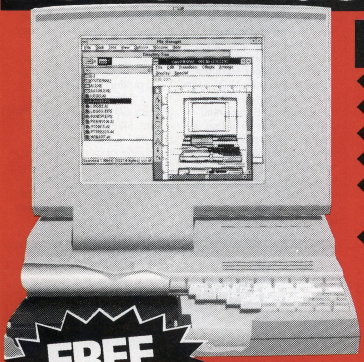
The CDD 521 behaves like a conventional CD-ROM drive. Consequently, it lacks the DOS habits expected of, say, hard disks. You cannot write to a disk by using DOS' XCOPY or COPY commands, for example, or rename a file once it has been written to the CD.

For making CD-ROM disks in DOS, Philips Consumer Electronics includes CDwrite software with the unit. Using simple commands from the DOS prompt, you can copy files from a hard disk or other storage device to a blank CD-R (recordable) disk. Though it is possible to make up to 99 multiple (or multivolume) recordings on one disk, you can only read these additional volumes by using the CDD 521 with CDwrite. To make disks for playback on current CD-ROM players, you must make a full recording in one session without additions.

'Multisession' (or Mode 2) CD-ROM players that can read CD-R disks containing multiple recordings are expected to enter the market later this year, but standard (or Model 1) CD-ROM players will not play back multisession disks. It's possible that additional software could make multisession recordings compatible with Mode 1 CD-ROM players, but none are currently available.

One other salient limitation of CDwrite is that the CDD 521 will only recognise filenames that are alphanumeric. This is a restriction of maintaining compatibility with the ISO 9669 CD-ROM filenaming convention and the Microsoft MSCDEX driver. Consequently, it limits the recorder's use for archival storage, since many files in word processing applications contain tildes and other non-compatible characters. When the CDD 521 encounters such files, the copying process is aborted. Philips hopes to upgrade its software later this

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AT A GLANCE

Philips CDD 521

Distributor: Philips
Telephone: (02) 925 3333
Price: $12,000
Requires: A 25MHz 386DX PC with 1M of RAM, a hard disk, DOS 4.01 or later
In short Ideal for users looking for a simple way to create single CD-ROMs for presentations, jukebox databases or limited distribution of large amounts of data.

year to recognise all DOS filenames, but that capability may also depend on changes to the MSCDEX driver.

In every other aspect, tests conducted on the CDD 521 ran smoothly. CD-ROM disks recorded on the Philips drive played back smoothly on a variety of CD-ROM players. We detected no further compatibility problems with application or data files.

The CDD 521 is clearly not intended as a substitute for a CD-ROM player. With a rated average access time of one second, the CDD 521's performance was slow in comparison with standard 380ms (millisecond) CD-ROM drives. On *APC*'s CD-ROM throughput tests, which are designed to gauge the ability of the drive to read and transfer large amounts of data, the CDD 521 was not up to the speed of 150K per second required to meet the Multimedia PC specification. Using a 2M file, the average sequential throughput was 35.6Kbps. According to Philips officials, the software currently shipped with the CDD 521 is optimised for recording and not for playback.

In recording tasks, the unit is quick. It can write to disks at double speed, meaning that a CD-ROM can be created in approximately 30 minutes (as opposed to the 60 minutes required by the first generation of CD recorders). Using a 25MHz 386 Compaq Deskpro/M, the CDD 521 took one minute one 17 seconds to copy a 3.1M directory from the hard disk.

Despite its current limitations, the CDD 521 is an exciting product for users looking for a simple way to create single CD-ROMs for presentations, jukebox databases, or limited distribution of large amounts of data. Competing recorders are available from JVC, Sony and Yamaha, but the Philips model is currently the least expensive and easiest to use in a PC environment.

John Quain

XTree for Windows is cluttered with good features

I've never really liked XTree for DOS. I know that traditionally it has been considered the standard for PC file management, but there has always been something about it that irritated me. I was, therefore, wary of my preconceptions when I first came to look at the Windows version.

XTree for Windows is a good product. Working with it gives the impression that someone became sick of the Windows File Manager and set out to build a utility that included all the features missing from it — a job well done, even though it has a few flaws.

XTree for Windows requires considerable screen real estate for effective usage. At first, I tried using the program under standard VGA, in a non-maximised Window, which is usually how I use the Windows File Manager. Not with XTree, however. To use it effectively, I needed Super VGA resolution and a maximised Window.

The program uses a row of Smart Icons across the top of the screen, which are too useful to remove, even though they take up space. By default, you have a list of all available volumes in a window found on the left-hand side of the screen and a directory path windows on the right-hand side.

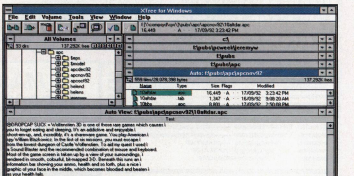
While you can expand XTree for the volumes on the left-hand side, every time you double-click on a volume or directory path to open it, XTree opens another window on the right-hand side. While it's possible to simply expand the tree on the left completely, this starts to make moving between multiple volumes a nuisance, and it's in working with large numbers of volumes (on a network, for instance) that XTree is most useful.

With a few paths open, you end up with as much space being occupied by the cascaded window title bars as is taken up by the directory you're working on.

XTree for Windows also comes with a wide range of viewers for most applications and application types. Viewing almost any file, whether they're Macintosh Word or dBASE III files, is easy. Simply select the file and click on the view icon; a window appears at the bottom of the screen with the files contents, which can then be exported or captured.

Working on several volumes with many paths open, however, quickly crowds the screen, but this is a small sacrifice when considering that XTree is packed with features, runs quickly and is simple to use. The program is the most useful utility I've seen for extensive file management on a network, and includes facilities that make mapping and managing server volumes kid's stakes. ZIP archives can also be mounted as volumes, and individual files or paths extracted with a minimum of fuss.

The package also includes



You'll enjoy XTree for Windows' features, but wish you had a bigger monitor

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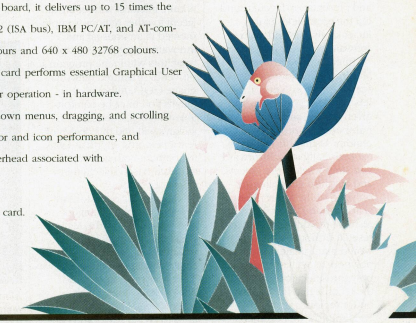


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XTreeLink, a utility that works in conjunction with either XTree for Windows or XTree Gold, which allows access to files on a laptop or another PC hooked up by cable. The advantage of this over a package such as Brooklyn Bridge is that with XTreeLink you use the same file manager for moving files locally, over a network or between linked PCs.

Jeremy White

AT A GLANCE

XTree for Windows

Distributor: Tech Pacific
Telephone: (02) 697 8666
Price: $138
Requires: IBM AT, PS/1, PS/2 or compatibles capable of running Microsoft Windows, 2M of RAM, a hard disk, a Windows-compatible display monitor, DOS 3.3 or higher and a mouse. (XTree for Windows does not operate in Windows 3.0 Real Mode.)
In short: XTree for Windows provides useful common-sense tools for file management, especially on networks.

MapInfo for Windows Version 2.0 brings your business down to earth

MapInfo for Windows ($1750) has always carried out a superb job of applying the often arcane abilities of a geographic information system (GIS) to business tasks. It's a powerful tool for any job that involves demographic analysis, from marketing plans and direct-mail campaigns to the evaluation of sales territories. In Version 2.0, enhancements in the geographic database query, map projection, geocoding (the attachment of geographical location information to data records so that they can be placed on a map) and presentation layout round out the capabilities of this increasingly rich and mature software product.

In addition to offering MapInfo's previous radius search function, Version 2.0 lets you select objects within a given 'buffer' area around any number of points, lines or regions. Using this feature is exceptionally straightforward: you simply select the objects, and MapInfo generates a polygon of the appropriate shape around them. You can reshape the buffer region and reset its attributes just as you would manipulate any other polygon, as well as use the polygon-select tool to select the records that fall within the buffer region.

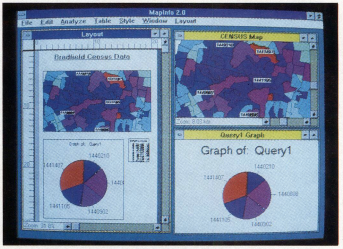
MapInfo's well-designed multi-windowed interface helps you analyse data in several ways. In addition to creating maps from database information, you can also view the databases themselves in tabular form and make simple graphs of numeric data. Its innovative file system lets you work directly with files in .DBF, .WK1 or .XLS format. A supplementary table file keeps track of geographic and other MapInfo-specific information.

Version 2.0 enhances the program's robust relational data-handling functions with some powerful GIS capabilities. The program's method of selecting regions that are within, intersect with or are adjacent to other regions is implemented in an unusual and innovative way: as geographic operators within the program's powerful structured query language (SQL). Although this means you must be comfortable with SQL queries, code jockeys will find this design offers a powerful shorthand way to combine both geographical and data-based selection in a single operation.

Geographic operators are especially useful in conjunction with the powerful MapBasic development language, which developers can use to create customised mapping-based information systems. The package comes with several small MapBasic applications to create scales and convert symbols, and you can purchase the full development kit — MapBasic Development Environment — for $1295.

Although MapInfo's database capabilities are powerful, the mechanics of querying could stand some refinement. The Select and SQL Select functions use slightly different syntax for identical queries, while appends and joins are handled separately from either. Even though you can use buttons and lists to build SQL queries by pasting table names, column names and functions into the query window, the program provides you with no help in puzzling out the syntax except in telling you whether you're wrong. This poses problems with the geographic functions, which are quite counter-intuitive. The syntax error checker does not pinpoint the location of your errors, and the help system is non-standard, badly designed and not context-sensitive.

MapInfo's clear and easy-to-use geocoding function (which operates on selected records as well as entire files) is one of its major advantages. Version 2.0 gives you finer control over the process. You can now specify an additional boundary file to refine the search (this is most useful when address-matching in large metropolitan areas, where the same address may occur in different neighbour-



MapInfo Version 2.0 features new geographic and presentation features

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hoods or cities) and display an additional column (the city name, for instance) to help you pinpoint ambiguous addresses. There's also help for those hard-to-match addresses: records that fail to geocode can have 'result codes' attached to a separate column in the database, letting you select and bulk-correct such records. Unfortunately, geocoding is still slow; it took half an hour to make a first pass through our 7144-record test database.

Version 2.0 is equally impressive for its newfound presentation capabilities. Its flexible WYSIWYG layout window lets you place any number of map views, legends, scales, data tables, and other text and graphics elements freely on a page; there is no limit (other than printing complexity) on the number of insets you can use on a single map. Each map frame is fully live, and updates itself as you change the data or zoom level of the source map.

Another plus: you can switch to any of many dozens of map projections on the fly, without a lengthy export process; with a numeric coprocessor or a 486, the conversion takes place rapidly. You can export presentation-quality maps in .WMF format or snap a view to the Clipboard in .BMP format.

In the thematic mapping arena, MapInfo is capable of scaling symbols proportionately as well as letting you select them by type. Its ability to perform basic summaries (record counts, sums, averages, and so forth) on records is another plus. You can apply thematic shading or symbols to any layer, so the number of variables on a map is only limited by your ability to understand them. You can't carry out bivariate themes (for instance, symbols that vary in both size and type) on a single layer, however. The program unaccountably fails to support shading by standard deviations (although the manual documents how to generate the ranges), and you can't cut and paste the summary statistics the program generates.

Text and label handling has been improved with of TrueType and other font-manager support. You also have a much larger selection of line and fill patterns from which to choose, though colour palette handling is still awkward. Labels (which you can apply automatically or individually using any data field or expression), as well as symbols and other annotations are located on a separate 'cosmetic layer'.

In terms of performance, MapInfo could use a thorough tuning. Although its basic redraw performance seems adequate, it could cut down on the number of unnecessary total redraws, as well as incomplete redraws that force you to spend the time to redraw each window manually. Printing can also be glacial, though the resulting PostScript files are not overly large.

Finally, the program could offer a better selection of basic map files: the included data is limited to state boundaries with basic population and income data, plus postcode centroids, and a few sample street and world maps. Such basics as county boundaries and highways must be purchased separately. Fortunately, the postcode boundaries are of high quality, and you can also import and export geography directly in .DXF format, as well as digitising paper maps.

MapInfo for Windows is now a stable product, free of the annoying instability and bugs of the first release we tested. If the data you work with incorporates a geographical or locational component, MapInfo can help you make sense of it all.

Rock Miller

AT A GLANCE

MapInfo for Windows Version 2.0

Distributor: Peripheral Systems
Telephone: (02) 437 6255
Price: MapInfor for Windows, $1750; MapBasic Development Environment, $1295; upgrade prices available on application
Requires: 4M of RAM, 6M of hard disk space, DOS 3.1 or later, Microsoft Windows 3.0 or later and, a mouse
In short: A steady advance on a solid foundation, MapInfo 2.0 continues to improve at the task of applying powerful GIS technology to business problems.

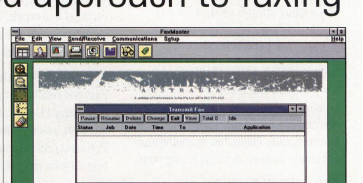
FaxMaster: a civilised approach to faxing

For anyone who has ever used E-mail and PCs heavily, faxes are a primitive technology. Unfortunately, they are also very popular; after all, anyone can use a fax machine. You simply feed in a piece of paper at one end, enter the number (destination), and whammo!

Later, the fax modem rescued many PC users from the ignominy of having to stand in a queue for the fax machine. Rather than having to print out their documents on a conventional printer and then feed them through a fax machine, users could now, print to another user's fax machine directly through a fax modem. The user simply selected the fax modem as their printer and added a telephone number. Receiving a fax was just as easy — it was converted to a graphic file that the user could read onscreen with a viewer or laser print out on plain paper.

Unfortunately, the information received through a fax modem still took the form of a Neolithic paint file, and however comparatively beautiful the output from a fax modem might appear at the other end, a bitmap that output remained until now, that is.

FaxMaster, from OmniPage,



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is a fax package for Windows that incorporates Optical Character Recognition (OCR) software. When someone sends a fax to your fax modem, instead of receiving a grimy image, you'll receive text that has been spell-checked, and that you can even edit, save, cut, paste and layout.

The review copy of FaxMaster was in beta, so it did have a few problems: it was a little slow (it appeared to slow down Windows operation while sitting in the background) and suffered incompatibilities with global keystrokes such as Ctrl+Esc. My machine also crashed several times with the software running, but that may mean nothing at all.

We can assume that these fudges will be rectified in the final release, which should be available as you read this. Even with these problems, however, the package is still very good.

The compression techniques used for archiving, for instance, work quickly and effectively: for example, a fax that can take up to 255K in uncompressed mode can be compressed to save up to 93 per cent of space.

Both Send and Receive operate well in the background, and sending faxes using Adobe Type Manager or True Type fonts through a fax modem produces crisp output. Where the destination is a conventional fax machine, the results can be quite impressive, especially if the recipient is using a fax modem with OCR. FaxMaster also provides for the automatic laser printing of received faxes.

The package's built-in OCR software is probably one of its better assets; even though you need to go through and tidy up the resulting text (as is always the case with OCR packages), the level of accuracy seemed very high. No doubt this was helped by the built-in spell-checker and OmniPage's years of experience in this field.

Corrected words are marked in the OCR window in blue, and unrecognisable characters are marked with a user pre-defined character. FaxMaster can be configured to automatically convert all incoming faxes to text, or only those selected by the user manually.

One of the biggest problems when using fax modems has been in storing received faxes. My test fax, uncompressed, took up 255K. Compression reduced it to just 18K, but the actual text itself produced by the OCR module was only 0.5K.

FaxMaster can also handle input from scanners — both to send as faxes or convert to text — giving the package functionality beyond its fax capabilities.

OmniPage's OCR software is among the best available. FaxMaster combines this high-quality OCR software with a reasonably good fax front end. The result: a worthwhile package.

Jeremy White

AT A GLANCE

FaxMaster

Distributor: OmniPage
Telephone: (02) 906 4900
Price: $599
Requires: An IBM PC or compatible with at least 8M of free hard drive space and 4M of RAM, and running Microsoft Windows.
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Is 'Big Brother' really out there?



With the advent of the pager came the mobile phone, and now, get ready for the portable E-mail station. But is it necessary?

JEREMY HOREY

I recently wondered just how much the work style of people who head up large computer companies determines what products those companies will invest their development effort in.

On his recent visit to Australia, John Landry, senior vice-president and chief technical officer of Lotus, discussed the potential for the little Hewlett-Packard 95LX. According to Landry, there will soon be a cellular connection to the 95LX that will make it the ideal portable E-mail station.

At regular intervals during the day, the 95LX, or its successor, will dial into the user's office network and download their latest E-mail messages. A discreet red light will appear when new messages are waiting to be read.

While I'm sure that this unit will find an enthusiastic market, I believe it will be only small.

I'm already dreading the day I'll need to carry a cellular phone around, but imagine never being able to get away from your E-mail messages.

While this might appeal to the likes of Landry, I certainly wouldn't want anyone to feel they could send me an E-mail message at any time and then expect a reply. I like E-mail; it's a non-intrusive communications medium, which has distinct advantages over the telephone or face-to-face communication, but it's certainly not a replacement for either form of communication.

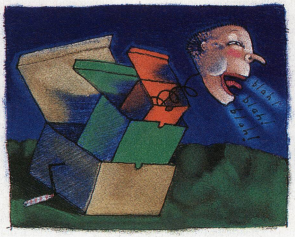
While it might give my ego a boost, I certainly don't want to feel *PC Week* cannot operate without my constant input. Indeed, no organisation, except perhaps a one-person business, should always need to have the boss at hand to operate successfully. If it does, then the boss isn't doing his/her job properly.

All members of an organisation should be encouraged to make decisions for themselves, and the organisation should endeavour to train those staff members to assure that those decisions are the right ones.

I suspect that people such as John Landry (and John Sculley, Bill Gates, etc) have grown so used to being the main decision-making force in their organisations (or parts of their organisations) that they feel they must always be in contact with their offices. If I'm right, then they're not doing their job properly either.

I have long believed that the role of the chief person in any organisation is to set the plans for the future and leave the implementation of those plans to his subordinates. Of course, the chief should have a monitoring role in order to ensure that the plans are being implemented correctly.

Now, about that portable E-mail connection again: there are certainly some people who need this technology, but it won't be the next mass-market product that Landry expects it to be. Unfortunately, his own work style has given him the illusion that portable E-mail is a 'must have' item. It isn't.



Don't be bamboozled by the latest communications mod cons. They may seem practical, but what about some privacy!

Lies, more lies, and benchmarks



'There are, in fact, two things: science and opinion; the former begets knowledge, the latter ignorance.'
— Hippocrates

BILL MACHRONE

Computers are commodities, or so the story goes. Applications rule. Therefore, you should buy the machine that is fastest at running your application. It sounds logical. But the rhetoric that surrounds benchmark testing has split the advocates into two camps: those who espouse 'real-world' benchmark tests, and those who champion 'synthetic' benchmarks.

Common sense tells us that real-world benchmarks are superior to synthetic benchmarks. Remember, though, that there's nothing particularly real-world about using a stopwatch and running a set of instructions that may or may not match what you do with an application. It's not a real-world benchmark; it's an application benchmark.

Synthetic benchmarks, on the other hand, have a name that sounds suspiciously similar to 'Frankenstein'. Synthetic benchmarks aren't synthetic at all; they're real tests of isolated components. Just as swimming exercises your entire body and weight lifting isolates specific muscle groups, benchmarks exercise the computer in different ways. So, let's dispense with benchmark bigotry and talk in terms of application benchmarks and component benchmarks.

Every application works through a multiplicity of layers to get to the hardware and perform the desired result. Think of the application layer as 'what' the computer is doing, and the operating system and drivers as 'how' the computer does it. The hardware itself is the 'why', since the silicon and the circuitry are relatively immutable. Thus, the application is heavily dependent on a host of other things being carried out properly. The user in search of ultimate performance chooses the fastest application, operating environment, drivers and hardware.

How's your vision?

Anyone who claims that computers are indistinguishable from one another needs glasses. Most cars have four wheels, consume fuel and take us from 'A' to 'B', but we normally buy the car that suits our needs and lifestyles. If we have trouble distinguishing one from the other, then we ask for the advice of someone more knowledgeable.

Likewise, superficially identical computers vary widely in their performance. The processor runs at its designed clock speed, but how many of those CPU cycles you actually get to use makes the difference between a fast machine and a slow one. The differences are dramatic. The most popular way to boost efficiency is with cache memory, which holds a small portion of main memory contents in very fast memory chips that the processor can access without wait states. The actual hit rate of caches can vary from around 70 per cent to less than 10 per cent. When data is not in the cache (a miss), it's loaded from main memory with more than the usual wait-state penalties. Thus, a slow cache can hurt system performance.

Disks and disk controllers vary widely in their ability to move data to and from the processor. Manufacturers mask the differences with a disk cache. Disk performance is a complex set of interaction among seek times, data rates, the cache size and the bus width.

The ground rules continue to change: Microsoft Windows 3.1 increases its performance by bypassing DOS and going directly to the controller. This limits compatibility with some high-performance controllers, but in most cases, it helps dramatically.

Video performance also varies widely. Starting with the raw-performance potential of the chosen VGA chip, it's all downhill from there because the video memory organisation, bus interface, VGA driver and application get in the way of fast screen draws and refreshes. The current VGA generation does more in hardware, shifting some of the load from the driver. The next step to be taken will be towards local-bus implementations of these chips, with 32-bit interfaces to the processor bus.

Don't try this at home

Application programs are the unwitting victims of all these complexities. Executing an application benchmark tells you one thing: that application's speed on that machine with that configuration. A simple change to your CONFIG.SYS or AUTOEXEC.BAT file can make a dramatic difference in performance. Since application benchmarks normally use the application's macro language, they are also dependent on the skill of the writer.

Application benchmarks have another annoying problem: you can't distribute them, and you obviously can't guarantee that all PCs have the same configuration.

We're still left with the critical question: which one is faster? It takes a real effort to understand all the subtleties and interactions among system components, but only component benchmarks isolate the performance of components to the extent that the buyer or systems integrator can make informed decisions.

A demilitarised zone exists between application and component benchmarks: profiling. Power users, intermediate users and beginners all have different profiles. A monitoring program records the operations of users carrying out everyday functions. Then, you build component benchmarks to match the profiles. This is unbelievably complex, but it's possible; *PC Magazine* Labs and Z-D Labs in the US are currently carrying it out. They're also correlating between application benchmarks and their component benchmarks.

There are no easy answers in performance testing, only difficult questions.

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Desktop publishing: ignoring a vital aspect

Despite rapid PC-based improvements in all aspects of print publishing, one all-important production phase has remained a manual dilemma for decades.

IAN ROBINSON

During the past few months, I've had the opportunity to be shown over the production processes of some of the world's leading technology publications. Things have certainly progressed over the past five to 10 years. Yet, I was reminded time and again of a glaring omission in the spread of PC-based tools available to publishers.

Software developers such as Aldus, Quark, Adobe Systems and Ventura Software have rocketed to stardom on the back of the desktop publishing phenomenon. However, the increasing sophistication of their products continues to ignore a vital aspect of magazine production — layout planning.

Every periodical publication I know of still relies on a manual, paper-based system when the initial page count, colour planning and section-layout decisions are made. However, since this process is usually based around fairly strict rules and guidelines, it cries out for computerisation.

Instead, however, most recent desktop publishing enhancements have been of an incremental nature, focusing on the 'nuts and bolts' end of the process — four-colour separation, imagesetter screen angle control, screen/printer colour matching, PostScript Level 2 support, and so on. There has been plenty of activity at this output-related end of the process, but relatively little consideration to the initial conceptual stages of production.

Yet sensibly designed layout-planning software could provide enormous efficiency gains, as well as eliminate many of the typical human errors that occur. How many times have you seen an insert card appear precisely in the middle of an opening spread of a feature? Or an advertisement obviously designed for a right-hand page appear on the left? Or a Page 3 article spilling to Page 143 and then to Page 297?

Possibly, many of these bloopers escape the notice of casual readers, but most editors, production managers and art directors have their own private collections of horror stories relating to layout-planning slip-ups.

A major attraction of automated layout-planning software — if such a facility is ever developed — would be the potential for integration with other (increasingly computerised) aspects of the publishing business.

Advertisement lists, for example, could be compiled in spreadsheet or database format (with all of the inherent accounting and analysis benefits), and then fed into the layout-planning software directly. The software could ensure that suitable locations were found for ads where clients had paid loadings for specific positions. It could also prevent against common planning errors such as accidental omission or duplicate placement of ads.

With high-frequency publications that are designed to a rigid formula — enforced by software stylesheets or templates — it would also be possible for layout-planning software to generate commands that set up all the relevant pages in the desktop publishing package. In fact, it would then only involve a minor extra step to specify the text and graphic files in the layout planner, so that these are automatically loaded in when the pages are first created.

It's important to note that such advances would not supplant any creative paste-up efforts. On the contrary, by automatically setting out all of the required text and graphics, it allows for more time to be spent on the creative phase of page layout and design. Many of the more mundane tasks involved in standardised page layout could also be automated a step further, but this would involve 'training' the layout software via some type of macro language or batch process.

Magazine page planning is a classic geometric puzzle that some people relish and others despise. While management pushes for maximum advertising ratios and the efficient use of the limited number of available pages, feature designers yearn for acres of 'creative white space', but there always seems to be more editorial copy left than pages remaining. This is a classic dilemma, but 'intelligent' PC-based software may one day provide a solution.

By using a computerised layout-planning aid, editors can prove to management that another four-colour sec-

(Continued on page 55)

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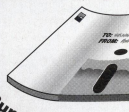
Upgrades

• **Telephone & Configuration** memories • **MNP 5** - data compression • **Line Condition Monitor** with visual read out • **Dialback & password** offers time charge reversal with security • **DES Data Encryption** with cypher feedback. • **Visual Speed Display** front panel displays speed of

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Technical : Group III fax: 9600 Send & Receive;
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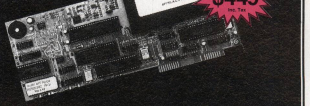
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Yes the INTERLINK FM3i is **TR29 class 2 compatible** (August 1990). This means that unlike other faxmodems, you are **not limited to one software fax package** and are free to select from a variety of international software faxing packages. When desk space is at a premium the INTERLINK FM3i is ideal as it is an internal model and unlike external faxmodems has no desk "foot print" • **AUSTEL** APPROVED

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Buy IT In Australia

The 'Buy IT In Australia' campaign addresses some important issues — but turns a blind eye to others.

HELEN DANCER

The market has been so conditioned lately to the awareness of counterfeit and pirate software that even the most simple purchase should elicit the Pavlovian response of a sense of duty in making sure that the origin of that software is legitimate. So the issue of ownership, one would think, has been comprehensively addressed.

Not so with the issue of grey marketing and distribution: many buyers are finding better deals on prices of both hardware and software by mail order, or on visits to Asia or the US. Apart from the issue that this raises about the real cost of software and vendor margins, there is the threat that this poses to Australian companies solely in the business of supplying product and systems integration services. The greyness of grey marketing and the threat to the Australian-derived distribution channel that this parallel importation poses has initiated a vendor-driven campaign called 'Buy IT In Australia'.

Supported by the BSAA and a number of larger (mostly foreign) hardware and software vendors, the 'Buy IT In Australia' campaign addresses, according to BSAA chairman Jim Macnamara, more than simply the question of legal importation; it also carries the message that the people who distribute and support hardware and software in this country should be acknowledged and nurtured for their part in the process.

It targets those consumers who bring in hardware and software from overseas to think beyond the price barrier to the greater benefits of buying their technology from Australian suppliers. The premise is that by buying overseas, the consumer does not contribute anything to the channel, but nevertheless expects it to be there when they need assistance.

Supporting imported or illegal software, Macnamara said, places a huge burden on suppliers and vendors, whose resources in this area are allocated as a proportion of legitimate sales, and research conducted on behalf of the BSAA suggests that a significant amount of product is presently bypassing the channel.

The campaign is fundamentally about supporting that channel and maintaining local jobs, according to Lotus Development's Kim Medway. If you buy a pack of Lotus, Aldus or Microsoft software, the profits are ultimately returned to the head office, usually in the US, since, like it or not, it's the source of most of our software. If, however, the software is purchased through a registered Australian outlet, at least part of that sale contributes to Australian revenues.

IDC analysis estimates that this part is worth around $1 billion a year as the cumulative total of revenue, which is that portion between what consumers pay and the amount that goes back to the vendors. A substantial part of this money, it must be stressed, is in value adding and systems integration, which seem to be mandated as a means of survival for distributors in an environment of smaller margins and tighter purse strings.

The campaign is apparently an answer to the question of whether there are other benefits to be accrued from having a locally derived distribution and support channel. It would seem to be a facile question, hardly deserving an answer because the benefits of such a network are self-evident, and the prospect of a future with only retail takeaways and no defined mechanism for supporting and adding value in design to systems in cardboard boxes is too horrible to contemplate.

In terms of that support however, it would seem that buying from the many retail avenues currently available is little different from buying overseas in terms of the support that can be expected. Support is not part of the package because the people who sell the computers there know as much about operating and optimising them as they know about repairing the fridges and washing machines that are sold on the same floor. So the responsibility again reverts to the vendor — who gets the profit back in the US, remember?

It is also true that Australia is, per capita, the most over-supplied market in the world, with a ratio of dealers to users of about 1:80 as opposed to 1:several hundred in the US. It's important to ask whether all these dealers would have survived the recession we had to have without a reasonable degree of marketplace support. Earlier this year, Howard Merry from HiSoft quoted a 33 per cent drop in invoicing, despite the fact that HiSoft had shifted the same number of boxes, but forecast a huge gain in his company's market share in the coming year.

A healthy distribution channel indeed begets increased support for smaller Australian companies with splendid ideas. Odyssey Development is a case in point — its ISYS software has shown strong growth with support from distributor Sourceware — proof that even local providers can benefit from a helping hand on the ground. But technical director Ian Davies, while acknowledging the importance of a strong dealer and the value of his company's relationship with Sourceware, stresses the many aspects of product evolution that the channel at large cannot help, such as the unnecessary complexities of the tax system and the exploitation of export opportunities.

This is the crux of the issue (a fact the 'Buy IT In Australia' campaign has avoided, either cunningly or subconsciously) — that what organisations such as the BSAA and the vendor community should and could be doing is bringing their industry muscle to bear in assisting Australian-derived good ideas to fruition and overseas success, instead of drawing a veil over the impor-

(Continued on page 55)



Maintain your investment

In today's whirl of technological breakthroughs, there's one piece of advice to give to prospective buyers: beware!

JOHN HOOPER

I'm asked many times each day a simple question that is paramount in the minds of everyone who is about to purchase a computer: 'How do I know that what I buy today will suit my needs tomorrow?' And another question soon follows: 'How do I know I'm getting a good deal for my money?' Both of these questions have the same answer: simply look at what you want the computer to do now and in the foreseeable future, and then buy a computer that is easily upgradable.

Upgradability is probably one of the most important issues facing computer buyers today because technology is becoming cheaper to buy. Every month, high-performing, expensive components that you wouldn't consider buying now are falling in price, and by this time next year, you'll probably be looking at them as an essential upgrade to handle that new program you just bought.

If you buy a computer today that has little or no expandability, and/or is a name-brand computer where every nut and bolt is patented by the manufacturer (and therefore not compatible with industry standard components), then you may have some problems to contend with. You'll realise that when the salesman said, 'Don't worry, you've got a local bus graphics card', or 'This computer has everything you want — hard disk/floppy disk controller and graphics card — built right into the motherboard', you actually bought a 'disposable computer' with all that hard-earned cash. This is one reason why good upgradable clones are so popular. They offer standard cases, standard monitors, standard power supplies, standard motherboards, standard video cards and standard hard disk/floppy disk controllers that can be easily upgraded individually, without having to throw away your investment in the other adequately performing components.

This approach to computer design has been blocked or only partially embraced by big-name brand companies because they want you to buy all future upgrades from them at inflated prices or, better still, throw the whole computer away and buy another 'disposable' computer. Another part of this same game is to set a very high list price for the computer and then sell it in a basic form through a discount retail outlet at a highly discounted price in order to compete with the clone machines. But there's a catch: most of these machines' warranties will be void if the computer is opened for repair or upgrade by anyone else other than the manufacturer. So when you buy a computer based on a big three, five or even 10-year warranty (which might only include a warranty on labour — not parts — after the first year), beware of any fine print and 'proprietary' designs.

The news is not all bad, however: there are Australian companies, which have the support of large multinationals such as Intel, offering good advice on computers. During a recent interview with Intel Australia's managing director, Geoff Healy, I was told of Intel's ongoing commitment to providing add-on boosters to the previous generation of Intel CPUs to boost them to the current generation's performance levels. This is the same technology that Intel introduced with the 486SX processor booster to boost 486SX motherboards to full 486 specifications by simply plugging an Intel chip into the numeric coprocessor socket.

Another innovation by forward-thinking designers/manufacturers is the introduction of universal motherboards that are made to full 486DX-50 specification but will accept any 386, 486SX or 486 CPU. This is a much better approach than previous upgradable designs because these new universal motherboards have been designed for the highest performance levels using the most demanding CPUs available.

Previous attempts at upgradable motherboards used simpler designs (for example, the 286), and then tried to make them work with the much more powerful 386 and 486 CPUs, inevitably causing inherent performance problems.

The universal downwards-compatible motherboards have none of these problems because they're built to use all the power and benefits of the 486DX-50 CPU, as well as the less powerful 386s and 486s. So, if you can't afford or (don't need) a 486DX-50 machine now, but you want to maintain your investment as long as possible, you can buy one of these 486DX-50 universal motherboards with a 386 CPU, and simply replace the CPU in six or 12 months when you need the power and when the 486 CPUs have dropped in price. In turn, you'll have one of the highest performing 386s you can buy with all the advantages of maintaining your investment.

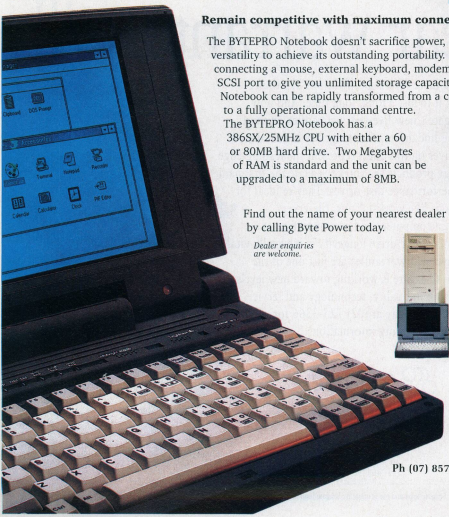
The moral to this story is 'buyer beware': ask the right questions before you buy a computer, deal with people that understand what they're selling and value those recession dollars.

The BYTEPRO Notebook. Just launched, with the power to go anywhere

The incredible new BYTEPRO Notebook PC has just been released. This stylish computer is tiny yet powerful and gives you complete freedom to go where you please and take the world with you.

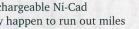
It also has more useful features for the price than just about any other Notebook PC.





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The BYTEPRO Notebook doesn't sacrifice power, storage potential or versatility to achieve its outstanding portability. With ports for connecting a mouse, external keyboard, modem, printer and a SCSI port to give you unlimited storage capacity, the BYTEPRO Notebook can be rapidly transformed from a compact powerhouse to a fully operational command centre.

The BYTEPRO Notebook has a 386SX/25MHz CPU with either a 60 or 80MB hard drive. Two Megabytes of RAM is standard and the unit can be upgraded to a maximum of 8MB.



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Wren 9	5.25"	1,900	31	3600
Elite 2	5.25"	2,129	40	5400
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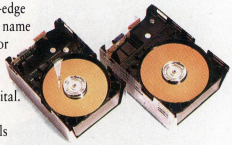
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IAN ROBINSON

(*Continued from page 48*)

tion is needed, for example, or that the sales team has to concentrate on full-page rather than quarter-page ad bookings. Somehow, a computer screen or printout is always more convincing than sheer force of argument (as most car and insurance salesmen have already discovered).

Layout-planning software, should it ever eventuate, could appear in a variety of forms: either as a standalone application, an add-on module for established desktop publishing packages, or an inbuilt enhancement to a new release of a current product.

Tight integration with popular packages would obviously be an advantage, although a standalone layout planner could prove quite handy in its own right. Keep in mind that there are still many publishing operations out there that have not yet fully exploited the advantages of PC technology. Starting off with a simple layout planner — as opposed to a disruptive transition from manual to fully automated systems — may be a smoother way to ease diehard hot-metal fanatics into the new age of publishing.

So, the idea is there, and I would not be surprised if it has been suggested by other publishing practitioners in the past. Having worked as an editor for many years myself, it all sounds very plausible and exciting — except that nobody (to my knowledge) has yet tried to develop such a product.

Surely this is an opportunity for Australia's much-touted software expertise to deliver a world-beating solution. After all, Australia's per-head magazine and newspaper consumption (like its beer consumption) ranks right up there with the world leaders. Therefore, it seems only fitting that we take the lead in this area, as we seem to have done in the brewing industry.

HELEN DANCER

(*Continued from page 51*)

tance of buying Australian over imported products.

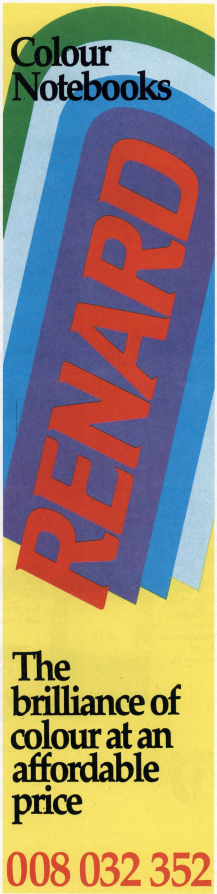
The campaign bears a remarkable resemblance to the 'Buy Australian' campaign, while, it seems, ignoring this issue of what its members should and could be doing to stimulate homegrown industry and prosecute the rights of Australian-bred ideas. The concept of 'do something for your country', or 'put the national good before your own pocket' is emotive stuff, which echoes hollowly in the mouths of foreign companies that take their substantial profits and head for the hills.

To emphasise the point, let me recount the tale of Australia's own telecommunications carrier — you know, the all-Australian telecommunications mogul, which has just spent untold millions refurbishing itself technologically for the '90s. On the question of virus protection software, our all-Australian carrier chose to spend more than $100,000 on an import, despite the fact that the world-acknowledged best product comes from Leprechaun Software in Queensland.

Leprechaun's Virus Buster recently scored well above the competition in intensive testing at the Virus Research Centre at the ICSA, and has as one of its many reference sites Bell Canada, which, one would think, is in the same business as our own beloved carrier.

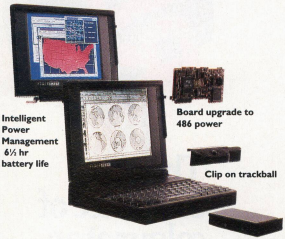
If we do not impute ill will on the carrier's part, it can only be attributed to lack of market awareness that Leprechaun was not considered or tested for the site.

Australia cannot afford to legitimise, whether by implication or design, the process by which made-in-Australia options that are demonstrably 'best of breed' are passed over in favour of imported products, whether or not they were purchased legally.





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DOS woes

MS-DOS and PC DOS — that is, Microsoft and IBM — have had an unfortunate monopoly on the PC operating system market. Digital Research has endeavoured to move into this market with DR DOS and other PC DOS by offering a package with greater functionality and scope.

The bugs found in DR DOS are not Digital Research's entire fault. Many companies develop their software solely by using the MS-DOS platform, and they will not guarantee or support their software running on DR DOS.

I recently purchased a copy of DR DOS 6.0, which is Windows 3.1-compatible, and have run into a snag using it with WordPerfect for Windows. Somehow, it tends to loose the printer drivers and you cannot print any documents. I tried to get it to work by reinstalling everything a number of times, but after a few days, the printer drivers for WordPerfect would go 'walkabout'. [When] MS-DOS was reinstalled, everything ran smoothly . . . with one hiccup.

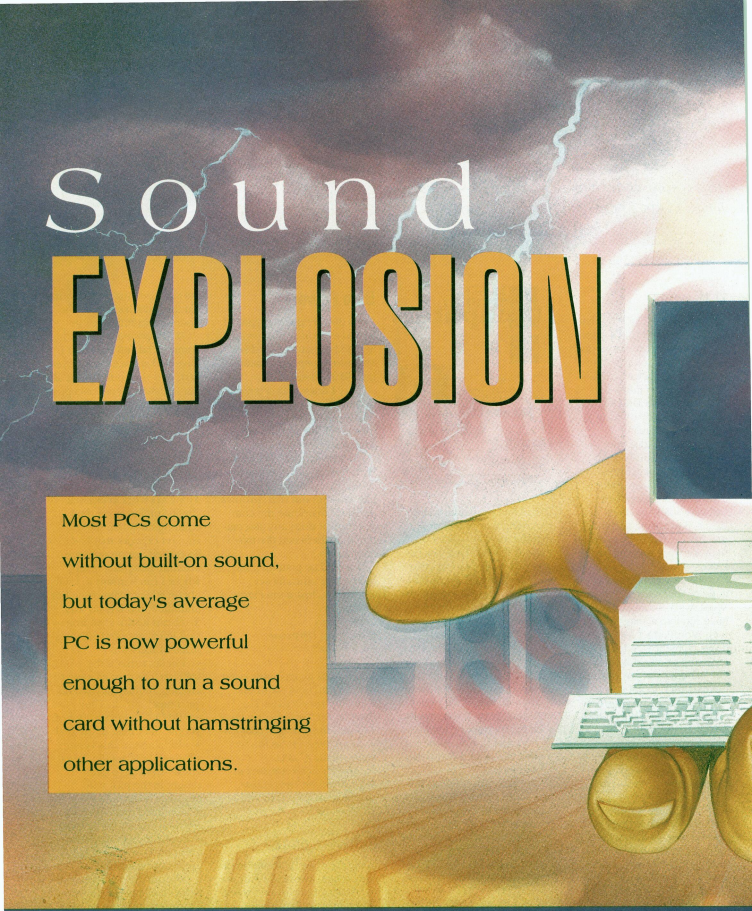
When I rang WordPerfect [with the problem], they informed me that they would only guarantee and support their product running under MS-DOS. The Australian Dealer Centre, which is the distributor for Digital Research products, could offer no solution to this problem. According to their tests, everything was fine, and when I asked for a refund, none was forthcoming.

There are a number of


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Sound EXPLOSION

Most PCs come without built-on sound, but today's average PC is now powerful enough to run a sound card without hamstringing other applications.



SOUND EXPLOSION



BY KESTER CRANSWICK

Sound cards are big business. In recent years, thousands of PC owners have discovered the aural dimension of their computing, bringing deafening sound effects to arcade games and adding sound to desktop presentations. Macintosh and Amiga owners have had sound for years, but now Intel-based PC users are discovering that digital sound is simply sensational.

The advent of CD-ROM has invigorated the PC sound industry. Whether it's a CD-ROM encyclopaedia that utters famous quotations, a multimedia version of Lotus 1-2-3 that can speak its tutorials, or Ultima VI with its awesome sound track, CD-ROM is winning consumers over. And CD-ROM demands sound cards.

Indeed, 1992 is shaping up as the year of the sound card. Window 3.1 is well equipped to handle sound, the Multimedia PC (MPC) standards have been defined and Microsoft's own sound card has been launched (see article in First Looks on page 30).

There is still yet to be a killer application that will make sound standard of the business or home PC. To most users, it is a relatively expensive luxury. But when you add up al the non-essential things that sound makes possible, a sound care becomes a more attractive proposition.

The biggest use for sound cards is still to enhance games. Every major game now has a soundtrack designed for popular sound-card standards. And while it may drive the neighbours berserk, amplified arcade games and talking adventures are to conventional gaming what sound movies are to silent films.

SOUND EXPLOSION

For the business user, multimedia is of growing importance. Desktop presentation has moved from slide shows to animated graphics, and is now beginning to incorporate sound effects and speech. The barrier is the wider use of sound cards — unless a PC is equipped with a sound card, it can't do much with audio files.

Compaq has carried out its bit for sound by including Business Audio in its upmarket PCs. Off the shelf, these PCs will record and play back 16-bit audio files, and come with a utility that allows sound grabs to be embedded in Windows documents. Other manufacturers may well follow Compaq's lead.

But for those millions of PCs without built-in sound, opt for a PC sound card. *APC* has gathered all the major sound cards available, including those from Aztech Labs, Creative Technology, Media Vision, and Turtle Beach. They have been tested for games, multimedia and musical applications, along with a selection of speakers ranging from the inexpensive to the exquisite.

The software provided with each of the sound cards is a good indication of their possible uses. Besides games, they can be used to speak back text, learn, compose and play music, as well as play back audio CDs as a background task.

The average PC is now powerful enough to run a sound card without hamstringing other applications. With a 386 or 486 processor, it is more than possible to record 16-bit sound in stereo at 44.1kHz. A 386SX CPU will run out of grunt with stereo recordings using a sampling rate of greater than 32kHz, while an AT-compatible 286 is good for mono recordings at 44.1kHz, but don't try stereo recording at better than 22.05kHz.

Installing sound cards can often be a problem because they use interrupts and I/0 addresses that may conflict with other devices. For instance, the default IRQ for a Microsoft bus mouse is IRQ 5, which many sound cards like to use. An Adaptec SCSI drive takes 330H as an I/O address, again causing possible conflicts. Be prepared to play around with jumpers to make the cards work.

In budgeting for a sound card, consider the cost of speakers. A good sound card with tinny speakers is not as good as a modest sound card with good speakers. Headphones are a good alternative to speakers if too much noise is a problem. You should also buy a microphone if you intend to sample voice or other sound effects, and if you want to play back music or multimedia applications, then invest in a CD drive.

Glossary

To most PC users, the terminology of sound is as confusing as PC talk might be to hi-fi buffs. But understanding the terms is crucial to selecting the right card.

Sound is a series of vibrations in the air. Analogue sound recordings translate those vibrations into a continuously variable voltage signal. For digital sound, those continuously variable signals must be converted to numbers, using an analogue-to-digital converter (ADC). For playing back the sound, the numbers must be re-translated back to an analogue signal that can affect the ear. A digital/analogue converter, or DAC, is needed.

No one number can represent the entire sound. The sound must therefore be sampled many times per second. This is called the sampling rate and is measured in kiloHertz (kHz). Typical sampling rates are 11.025, 22.05 and 44.1kHz, usually known as 11, 22 and 44.1kHz. The MPC standard is 11.025 and 22.05kHz.

The pitch of a sound is described by its frequency, again measured in kiloHertz. However, the physics of sound means the maximum frequency that can be played back is half the sample rate, a frequency called the Nyquist frequency. Because the human ear can detect frequencies from 20Hz to 22kHz, CD players sample at 44.1kHz. A telephone handset, on the other hand, sounds bad because it can only handle frequencies from 80Hz to 8kHz.

Frequencies which fall above the Nyquist frequency will affect the recordable frequencies by being 'folded over' into the recordable spectrum as inharmonious, low-pitched notes. Such a phenomenon is called aliasing. To overcome it, an anti-aliasing filter will be used.

Another digital sound term is resolution, expressed in bits. This describes the number of different voltage levels a device can resolve. An 8-bit device can distinguish 256 different voltage levels, the minimum for acceptable sound. A 16-bit device can discern 65,536 voltage levels. Audio CD quality is 16-bit sampling.

Finally, sound can be recorded in stereo or mono. This, the sampling rate and the resolution will determine how much disk space is needed to store a recording. A one-minute, mono, 8-bit recording at 11kHz will consume 661K of disk space. At 22kHz and in stereo, the same recording needs 2.6M. Doubling the resolution to 16 bits again doubles the storage requirement. And, at the high end, a one-minute, 44.1kHz, 16-bit stereo signal needs 10.5M of hard disk space. That's why many sound boards come with hardware or software data-compression utilities! However, not all file compression uses the same algorithm, so what is compressed on one card may not be playable on another.

The base standard for sound cards is now defined by the Multimedia PC Computing (MPC) specification. An MPC card needs, at a minimum, 8-bit resolution, 22.05 and 11.025kHz sampling playback, 11.025kHz recording, DMA or FIFO buffered transfer capability, and a microphone input. It also needs an onboard 11-voice synthesiser, and the means to mix CD, DAC and synthesiser audio signals.

MIDI stands for Musical Instrument Digital Interface. It is an international standard for the exchange of performance data between computers and musical instruments. MIDI data is not music — instead, it's a protocol for handling data that drives the instruments that make the music. However, MIDI files are much smaller than sound files such as WAV files.

The MIDI interface needs three five-pin DIN connectors for input, output and throughput. These connectors are usually combined in a breakout box that plugs into a MIDI port on the sound card.

Sound Galaxy BX

The Galaxy BX from Aztech Labs is the least expensive ($179) sound card of the group reviewed, and makes up for its sound shortcomings with a bundle of useful DOS software. It may not offer high-fidelity sound, but if dollars are short and you want to get musical with your PC, this could be the choice.

The $179 price also includes a pair of tiny bookshelf speakers. All you really need to purchase is a microphone. The card itself is a simple 8-bit, half-length affair. It comes with a volume knob on the back, is flanked by mono in and out ports, and capped off with a joystick port. What more can the enthusiastic gamer ask for?

Jumpers on the card allow a choice of two I/O addresses and four IRQs (interrupt requests). The software, on dual-format floppies, includes a test utility that provides a promising outburst of sound when everything is ready.

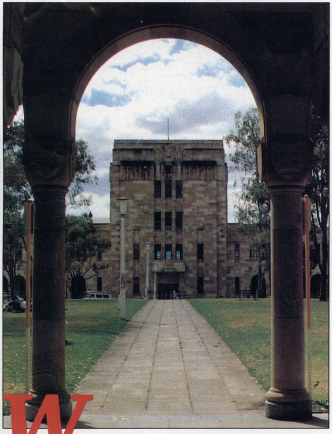
Galaxy BX is fully AdLib and Sound Blaster-compatible. Software installation is automatic, and neither the AUTOEXEC.BAT nor CONFIG.SYS files need to be modified in order for software to recognise the card.

The card, however, runs short in the high-fidelity department: it only provides mono recording and playback, though the sampling rate can be set as high as 44.1kHz. Automatic Gain Control will ensure soft sounds as well as loud tones are recorded, but while 8-bit audio output is fine for voice and explosions, music buffs may be disappointed. Nevertheless, the better the speakers, the better it will sound.

Galaxy sound cards allow files to be compressed by ratios of 2:1, 3:1 or 4:1, using hardware-based ADPCM compression algorithms.

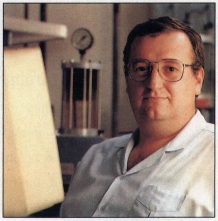
Windows software is limited to a utility called Galaxy Jukebox, which can loop

"We rely on BYTEPRO computers to monitor experiments for up to 12 months, non-stop"



NOVIBAU COMMUNICATIONS

-Martin Thomson,
Computer Services Officer,
Civil Engineering Department,
The University of Queensland.



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through a succession of MIDI files. However, no Windows drivers were supplied with the review sample.

For the DOS environment, a TSR utility called Song performs much the same, playing any of 29 CMF file format tunes. Then there's Galaxy Master, a competent, if unexciting, sound-recording and editing program. More impressive are the musical utilities. The best is Band-in-a-Box, a fun-to-use synthesiser that makes the most of the 11-voice, two-operator, Yamaha YF3812 FM synthesiser chip. It plays either six melody and five rhythm sounds, or nine melody sounds. A long list of songs and song styles is available, which can be played back on their own, or accompanied using the keyboard as a primitive musical instrument. Some keys can be used as drums, and an intelligent play-along mode even sorts out the duff notes!

With a song style in memory, chords can be typed in and played, the song can be edited, the style and instrumentation can be changed, and the whole lot can be saved or exported as a MIDI file. An optional MIDI breakout box will provide a link to other MIDI devices. It's not as good as a full-blown synthesiser, but it is a good introduction to the joys of synthesised music.

Keeping in the musical bent are two music tutorials: NotePlay is a game that teaches sight-reading of the musical scales, while Play It By Ear teaches the user to recognise musical pitch.

Monologue is a TSR text-to-speech converter that 'speaks' highlighted text. It comes with variable speed and volume, as well as a user-editable dictionary of pronunciation. It can also read both text and spreadsheet data.

With all this software, the Sound Galaxy BX is much more than a cheap game card; it's a good, basic introduction to the world of music.

ThunderBoard

Designed to compete on price more than anything else, the $195 ThunderBoard offers an improvement on the PC speaker, Sound Blaster and AdLib compatibility, at a modest price. Also known as the LaserWave, it comes from Media Vision, the same company that produces the more up-market Pro Audio Spectrum.



The half-length, 8-bit board has jumpers to select any of six I/O addresses and four interrupts. At the back is a volume knob and two sockets — one for line in, one for line out. With the card fitted, all that remains is to copy the utility files to the hard disk, fire up and run a test program. If all is well, a tone is emitted to enable you to set an appropriate volume.

The ThunderBoard came with two demo games — Lemmings, an arcade game, and Lexi-Cross, a crossword quiz — designed to show off some sound effects to keep you amused for hours.

With any game supporting AdLib sound effects, you'll find the ThunderBoard a real improvement on PC speakers, though the sound from the 8-bit DAC is monophonic and does not compare to more expensive boards. It has a lower sampling rate than the Sound Galaxy BX, but compensates with dynamic filtering to minimise sound distortion from other parts of the computer. It has a higher sampling rate for sound recording.

The Thunder Master sound editing utility runs in the DOS environment and is very simple to use. Files can be recorded in the Sound Blaster VOC or Windows WAV formats. Sampling, through a microphone or other line-in source, can be performed at any frequency ranging from 1 to 22kHz — better than the Sound Galaxy BX rate. Like the BX, AGC evens out recording levels. However, the file-compression routine is software based.

Any sound file can then be edited by a useful variety of means. The wave form of the recording is shown, so that any part of the wave can be cut, copied or changed. Special effects, such as reverse or echo, can also be added. Recordings can be slowed down or sped up, have their volume changed, or be mixed with another recording.

A comparative shortcoming of the ThunderBoard is that it has no MIDI interface. The manual advises users who want to improve the features of their sound card to buy a Pro Audio Spectrum and connect the ThunderBoard to it (an onboard audio connector is provided for that very purpose). However, if the Spectrum is used for an internal CD-ROM drive, you cannot connect the ThunderBoard.

Editor's choice

The 10 sound cards in this review fall into a number of categories (depending on your needs), with the specifications clearly indicating which one is the most appropriate for different applications.

Users on a tight budget will find the Sound Galaxy BX excellent value for money. It beats the ThunderBoard on most features and is considerably cheaper than the Sound Galaxy NX. Unless you need a CD-ROM interface, it's probably the best one for cost-conscious buyers to choose.

The Media Vision Pro Audio Spectrum 16 is the best midrange buy for games and multimedia. With 16-bit sound resolution, a SCSI interface and a good range of software, it is $100 cheaper than the new Sound Blaster 16. The extra quality of 16-bit sound makes it a better buy than the NX Pro and Sound Blaster Pro cards.

If your primary interest is music, you really need a card with a wavetable synthesiser: the MultiSound, Roland or AudioMaster. The AudioMaster wins hands down on value for money, though sound enthusiasts with more money to spend will find the MultiSound delivers a higher quality sound. The Roland should only be considered as part of a more-extensive musical outfit.

Sound Galaxy NX

Like its cheaper sibling, the $279 Sound Galaxy NX offers AdLib and Sound Blaster compatibility, a free set of speakers, a Yamaha YF3812 FM synthesiser chip and a bundle of useful software. In addition, it is compatible with Covox Speech-Thing and Disney Sound-Source applications, and has an AT-bus CD-ROM interface.



Installation is similar to that of the cheaper version. The card has jumpers to select the I/O address and interrupt, as well as one of two I/O addresses for the built-in CD-ROM interface. Software installation is automated, and a test utility is available to make sure everything is working as it should.

The software is almost identical; it comprises the TSR Song utility (with 20 songs), the Monologue text-to-speech converter, the Galaxy Master sound recorder and editor, Band-in-a-Box, NotePlay, and Play-it-by-Ear.

In addition, there is a volume-control utility that runs from the DOS prompt and allows the volume, balance, bass and treble controls to be adjusted. And to run an audio CD player, a DOS CD player utility is supplied. It only works as a CD player if the

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appropriate drivers are installed. The distributor supplies a Matsushita CR-522 CD-ROM as a separate kit for around $699.

With the CD player installed, the player utility offers all the controls of a normal CD player — play, fast forward, rewind, next track, previous track, plus volume, balance, bass and treble controls.

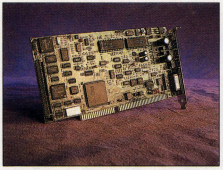
The only applications for the Windows environment is Galaxy Jukebox, which plays a selection of MIDI files. A Windows driver was supplied, though the MIDI.CFG file was not to be found.

The sound quality of the Sound Galaxy NX is better than that of the BX, with a sample-rate recording of 22kHz instead of 15kHz. However, the maximum sampling rate for playback is 44.1kHz.

For more professional sound effects, the joystick port can be adapted to a MIDI port, with the addition of a $145 MIDI breakout box. If you want to venture into music and play around with CD-ROM, the Sound Galaxy NX is an excellent starting point.

LaserWave Plus

The $345 LaserWave Plus from Media Vision is identical to the Pro Audio Spectrum. It's a half-length 16-bit card that comes with a stack of software and most of the features the average PC user wanting to break into sound would require.



Installation is a matter of slotting in the card and running some installation software. It tells you if the I/O, IRQ and DMA settings will work before installing the DOS-based applications. A separate Windows installation utility installs the drivers for Windows multimedia and some separate Windows applications.

I/O settings are adjusted with jumpers on the motherboard. IRQ and DMA settings can be set via software. The card has stereo input and output sockets, plus a mono microphone socket and a joystick port. Like most of the cards in this price range, it only has 8-bit sound resolution. The 16-bit connectors enable it to use 16-bit DMA transfer, ensuring that background noise is not distorted by fore- ground applications.

The LaserWave Plus is set up to connect an internal Sony CD-ROM drive, though a SCSI version is available. For an external CD-ROM, an optional adaptor bracket is needed.

Sound quality is better than the other products discussed so far, but still not up to CD quality. For DOS games, a Sound Blaster compatibility mode ensures that most games can be blasted through whatever speakers are connected to the LaserWave Plus card.

The LaserWave Plus' most redeeming feature is found in the software that accompanies it, which is particularly useful for non-Windows users.

Utilities control the recording parameters of different sound sources and things such as fades. The recorder will configure the sampling rate and can be used with better sound cards than the LaserWave Plus. Its Multimedia Mixer uses simple slide bars to adjust the volume of the card's synthesiser sound source, CD-ROM, stereo and microphone input; you can also toggle between record and play modes, and save the current settings.

The Pro Mixer adds additional controls, such as control over left and right channel levels, bass and treble, as well as special effects, such as fades in and out or across channels. It also controls a 'mixed' sound source, the PC speaker and FM synthesiser input from the 16-bit Yamaha YMF 262 FM synthesiser.

The DOS mixer, PAS, is even more powerful. It has a graphical control panel, online help and command-line input, and can queue up to 16 commands for the sound card. DOS users will also find utilities to play and record files from the command line or a batch file. AudioMate is another DOS utility that works with desktop presentation applications such as Autodesk Animator Pro, Harvard Graphics and Lotus Freelance Plus. Running as a TSR, it links sound files with individual slide files, playing the sound file when the slide is displayed. The sound files are created in a companion program using CD-ROM, MIDI or digitised sound files.

For creating and editing MIDI files, a DOS application called Sequencer Plus Spectrum is provided. Written by Voyetra Technologies, it plays MIDI, Roland and Voyetra sound clips. It supports a mouse and turns the keyboard into a primitive synthesiser, complete with metronome. The synthesiser interface provides 128 different instrument sounds, and will supply 18 voices in instrument mode, or 12 instruments and 10 drums in drum mode. Data can be cut and pasted, notes can be edited, and compositions can each comprise up to 50,000 notes. It's a complex application to master, but would-be composers will find it great fun.

Other utilities include an editor to edit the tones of the built-in synthesiser; Stereo Studio F/X, which is a DOS-based waveform editor (a simple text-to-speech

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Sound cards: summary of features

● — Yes
○ — No

	Sound Galaxy BX	Thunder-Board	Sound Galaxy NX	Laser-Wave Plus	Sound Galaxy NX Pro	Sound Blaster Pro	Media Vision Pro Audio Spectrum 16	Sound Blaster 16	Audio-Master	Roland GS Sound Card SCC-1	Turtle Beach Systems Multi-sound
Distributor/Telephone	Enternet (03) 764 3399 Elite (02) 898 0222	ACS (03) 335 4100	Enternet (03) 764 3399 Elite (02) 898 0222	ACS (03) 335 4100	Enternet (03) 764 3399 Elite (02) 898 0222	Com-putamart (02) 906 8887	Chips & Bits (03) 696 5955	Com-putamart (02) 906 8887	OmniLabs (02) 319 2022	Roland (02) 982 8266	Mainly Multi Track (03) 558 1155
Price	$179	$195	$279	$345	$379	$399	$399	$499	$499	$795	$1395
Digital Audio											
Playback resolution	8-bit	8-bit	8-bit	8-bit	8-bit	8-bit	16-bit	16-bit	16-bit	16-bit	16-bit
Max playback sample rate	44.1kHz	22kHz	44.1kHz	44.1kHz	44.1kHz	44.1kHz	44.1kHz	44.1kHz	44.1kHz	44.1kHz	44.1kHz
Recording resolution	8-bit	8-bit	8-bit	8-bit	8-bit	8-bit	16-bit	16-bit	12-bit	N/A	16-bit
Max record sample rate	15kHz	22kHz	22kHz	44.1kHz	44.1kHz	44.1kHz	44.1kHz	44.1kHz	44.1kHz	N/A	44.1kHz
Stereo	○	○	○	●	●	●	●	●	●	●	●
Multisource recording	○	○	○	○	●	○	●	●	●	N/A	●
Volume levels	16	N/A	16	10	16	16	62	32	100	N/A	Stepless
File compression (max)	4:1	4:1	4:1	None	4:1	4:1	4:1	4:1	None	N/A	N/A
Synthesiser,											
Synthesis method	YM3812	YM3812	YM3812	YMF 262	OPL3	YMF 262	YMF 262	OPL3	Wavetable	Wavetable	Wavetable
Voices	11	11	11	22	20	22	22	20	24	24	32
Operators	2	2	2	4	4	4	4	4	N/A	N/A	N/A
Pre-set instruments	N/A	N/A	N/A	128	N/A	20	128	None	128	317	126
RAM for instrument	None	None	None	None	None	None	None	None	384K	None	384K
MIDI interface	Optional	○	Optional	Optional	Optional	Optional	Optional	Optional	Optional	●	Optional
Other,											
Bus interface	8-bit	8-bit	8-bit	16-bit	16-bit	16-bit	16-bit	16-bit	16-bit	8-bit	16-bit
Card size	Half-length	Half-length	3/4 length	Half-length	3/4 length	Half-length	3/4 length	Half-length	Full-length	Half-length	Full-length
I/O port settings	2	6	2	3	2	2	3	4	2	4	8
IRQ settings	4	4	4	8	4	4	12	4	4	6	1
DMA settings	0	0	0	2	3	3	7	3	3	0	0
16-bit data transfer	○	○	○	DMA	○	○	DMA	DMA	DMA	○	Hurricane
Joystick port	●	●	●	●	●	●	●	●	●	●	●
Microphone	○	○	○	○	○	○	○	○	●	○	○
Line out	Mono	Mono	Mono	Stereo	Stereo	Stereo	Stereo	Stereo	Stereo	Stereo	Stereo
Line in	○	○	Mono	Stereo	Stereo	Stereo	Stereo	Stereo	Stereo	○	Stereo
Audio amplification	4 W	2 W	4 W	4 W	4 W	4 W	4 W	4 W	4 W	None	None
CD-ROM interface	○	○	AT-bus	Sony	AT-bus	AT	SCSI	Sony	Optional	○	○
Software											
Windows support	○	○	●	●	●	●	●	●	●	○	●
DOS drivers	○	○	○	●	○	●	●	●	●	○	●
Sound editor	●	●	●	●	●	●	●	●	●	○	●
Audio mixer	○	○	○	●	●	●	●	●	●	○	●
Synth emulator	●	m	●	I	I	I	I	I	I	m	I
Speech processor	●	○	●	●	●	●	●	●	●	○	○
Sound Blaster - compatible	●	●	●	●	●	●	●	●	●	○	○
AdLib compatible	●	●	●	●	●	●	●	●	Optional	○	○

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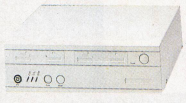
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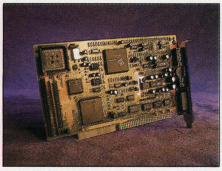
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utility); and TrakBlaster Pro, a utility to play back MOD sound files created on a Commodore Amiga. The playback display for any of the 11 MOD files is worth watching!

Sound Galaxy NX Pro

What a difference the word Pro makes! The $379 Pro version of the Sound Galaxy NX card is a vastly better peripheral than its competent stablemate. It has stereo and a better synthesiser, with 20 voices and better applications for the Windows user, as well as all the features of the non-Pro version, for virtually the same price.



The packaging includes the same set of free speakers and a similar set of applications. However, the card itself is completely different. It's a half-length device with a stereo audio output socket, a joystick port (doubling as a MIDI port), and a line-in and line-out socket found on the back. The synthesiser chip is the Yamaha OPL3, an improved version of the Yamaha YMF262 chip. There's also a spare chip socket, used in a $399 SCSI Pro version of this card to hold a SCSI controller.

The card has jumpers to set the I/O addresses, interrupts for the card and CD-ROM drive, as well as 'change the PC speaker amplification', 'redirect the PC speaker' and 'set up a virtual parallel port for Disney Sound-Source' compatibility. A test utility, which is found where DMA channel setting can be altered or the CD-ROM interface disabled, confirms everything is okay. This card really leaves nothing to be desired in the setup area.

Some of the applications are the same ones that come with the other Sound Galaxy cards. They include Galaxy Master (to record and edit sound files), Monologue (a text-to-speech converter), CD Player, and Song (to play back songs under DOS).

But there are other applications suited to the better capabilities of the NX Pro. For instance, there are three different mixer programs: one running TSR under DOS, another running the DOS command-line program, and a Windows mixer. Each one allows the relative levels of six different sound sources to be adjusted, on both left and right channels, over 16 levels. Overall volume, balance, treble and bass can also be adjusted. The Windows program looks snazzier, but all perform the same job. The command-line utility could be used in batch files.

For recording, the NX Pro has automatic gain control to improve recording quality, as well as two 8-bit ADCs, with a sampling rate of 4 to 44.1kHz in mono mode. For stereo, the sampling rate is halved. However, two 8-bit DACs with stereo playback at 44.1kHz and programmable filtering provide very good sound effects.

The 20-voice synthesiser is not used often in the supplied software, but with an appropriate musical application, it offers the chance to play more complex compositions than the NX. An optional MIDI adaptor will channel the output to MIDI devices.

For the Windows user, a standout application is the version of Voyetra's Jukebox included with the NX Pro. Armed with a CD-ROM and the NX Pro, users can set playlists of tracks from WAV, MIDI and audio CD sources. These play in the background and, with a powerful CPU, will not impact greatly on foreground applications.

Another Windows application is called WinDat. It is a classy waveform sound recorder and editor, with an easy-to-use interface and a host of special effects. The final Windows application is SoundScript, a multimedia authoring language that works with the FLI format animation files made popular by Animator Pro. Using a BASIC-like language, it can trigger playback of MIDI, WAV, VOC and audio CD tracks.

All this adds up to an excellent sound card for the gamester, and multimedia aficionado, alike, at a reasonable price. It also makes the NX Pro a very different proposition from the Sound Galaxy NX.

Sound Blaster Pro

The biggest name on the sound-card scene is still one of the most entertaining. With the demise of AdLib, Sound Blaster became the standard for games, and the $399 Sound Blaster Pro is a bestseller.



Made in Singapore by Creative Technology, it is a professional product that rates well against other 8-bit sound cards. The half-length card slips into a 16-bit slot. At the back, you'll find unlabelled ports for a mono microphone, stereo audio in and stereo out, as well as a volume wheel.

Inserted and connected, a test utility checks the I/O address, IRQ and DMA settings. It then plays back sounds using two and four of the FM synthesiser operators, and adds a line to the AUTOEXEC.BAT file to get the Sound Blaster up and running. Windows drivers are installed through the normal procedures.

There's plenty of DOS software, though little for the Windows fan. With Windows, apart from a mixer to vary the level of different sound sources and a jukebox that can play a sequence of MIDI files, you are left to other applications. On the DOS side, there is both entertainment and music on offer, led by Sound Blaster's famous parrot. An onscreen parrot talks to you, mimics what you say into the microphone and laughs when you touch the keyboard. Great fun for the kids.

Also in the speech vein is a text-to-speech converter that delivers more than the Monologue package of some of the other sound cards, as well as a talking analyst, which generates inane comments based on your deepest thoughts.

Sound Blaster stores voice files in a format it originated: VOC. There are command-line utilities to translate these files to WAV format, reverse the translation, and record, play or combine the files. Another utility, MMPLAY, works with Animator Pro to add sound to desktop presentations. Using scripts, it can play VOC and MIDI files. Other utilities play MIDI and CMF files back from the command line.

A command-line mixer allows the input from up to six sound sources to be altered, and filtering to be introduced. One shortcoming of the Sound Blaster, though — it cannot simultaneously record different sound sources. Once sound is stored, a DOS waveform editor can be used to edit the sounds. It's as good as any other DOS waveform editor supplied with the other sound cards.

All these applications show off the Sound Blaster's abilities as a speech synthesiser. For the musically inclined, you'll find a CD Player utility to control any CD player that is attached (the Sound Blaster Pro has a Sony CD-ROM interface) and a keyboard emulator that turns the PC into a simple synthesiser, complete with special effects such as arpeggios, automatic chords, rhythms and a metronome. An optional MIDI interface will expand your musical options.

Sound quality is quite good, but if you want CD quality, veer towards a 16-bit card.

Pro Audio Spectrum 16

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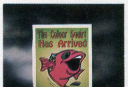
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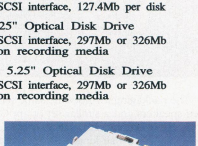


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the ThunderBoard and the LaserWave Plus, the Pro Audio Spectrum from Media Vision is a 16-bit card in all respects. It has 16-bit stereo playback and sampling, uses a 16-bit interface and uses 16-bit DMA for optimum performance. With 44.1kHz sampling, it even delivers CD-quality sound. That's a big plus.



The US-made card is a three-quarter-length device with jumpers to control I/O and IRQ addresses for Sound Blaster compatibility. Variables such as DMA and IRQ settings for other applications are set by software during the installation process.

In terms of software, this card has much in common with the LaserWave Plus. The same Windows applets to adjust the relative levels of different sound sources are provided. The Pocket Recorder betters the Windows 3.1 Sound Recorder in that it allows special effects to be added and shows greater detail around the recording parameters. There are also two sound level mixers, one more advanced than the other. The Pro Audio Spectrum has an exceptional 62 software-controlled volume levels.

But the real software stars are found in the non-Windows environment. Some of them have been encountered with previous sound cards. PAS, Playfile and Recfile allow sounds to be played and recorded from the DOS command line. Audiomate and its sister Audiolink application allow the user to attach sound files to popular desktop presentation packages. Spectrum provides the means to compose and play back songs over the Yamaha YMF 262 synthesiser chip, with its 20 voices and four FM sound sources. With an optional MIDI interface kit (around $129) attached, the same application can be used to drive MIDI devices.

The Monologue text-to-speech converter is also supplied, as is TrakBlaster Pro, which plays back four-part MOD files created in the Commodore Amiga environment. Finally, stereo Studio F/X is a DOS-based sound-wave editor for 8-bit sounds which has a graphical interface (similar to that used by Quattro), and can edit WAV, VOC and BIN files. It also has cut-and-paste features, zooming, and special effects such as echo and reverb.

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features such as a joystick port (doubling as a MIDI port), AdLib and Sound Blaster compatibility, a 690K per second SCSI port, and a 4W power output to the speakers. The difference that 16 bits makes is audibly discernible with musical tracks, so with its musical, games and interface appeal, the Pro Audio Spectrum 16 might be seen as a card for all reasons, particularly as it is the least expensive 16-bit sound card in this review.

Sound Blaster 16

In such a competitive arena, Sound Blaster has just released a 16-bit sound card to keep up with the likes of Media Vision. Priced at $499, the review card came as an advanced beta product with draft documentation and pre-release software.



Sound Blaster 16's new features include 16-bit recording and playback of stereo sound files, the ability to record from multiple sound sources simultaneously, a standard and Sound Blaster MIDI interface, plus some new software items.

The card is still only half-length in size, and has the same unidentified sockets on the back, plus a volume-control knob. The installation software tests all the I/O addresses and interrupts, most of which are set by jumpers on the sound card. Installation then adds lines to the AUTOEXEC.BAT file, installs the applications and leaves the user with the task of adding Windows drivers.

Much of the software is identical to that supplied with the Sound Blaster Pro. These applications include DOS sound and music players; the SB Talker text to speech utility; MMPLAY, the DOS electric organ program which unites sound and animation; and SBSIM, which lets programmers add Sound Blaster features to their applications.

Also included are some new Windows applications and applets. A 16-bit mixer is an obvious addition and provides an intuitive method of altering the sound levels of six sound sources to any of the 32 volume levels. Creative WaveStudio is a Windows-based soundwave editor with plenty of special effects, including an intriguing rap feature.

Unfortunately, no documentation or help files explained this particular facet of the program. There is also Mosaic, a tile puzzle with sound effects, and Creative Soundo'Le, a utility to embed sound objects in other applications. All in all, it is a useful set of Windows applications.

Promotional material with the sound card indicated that other applications would include Monologue for Windows and HSC Interactive to create interactive multimedia presentations.

An option supplied with the card is an E-Mu SoundEngine module — a sound-generation subsystem capable of producing professional synthesiser sound. With the E-Mu module, users will need more than one free slot to accommodate the card. This could cause problems for users with restricted space inside their PCs. No software to drive the E-Mu was supplied, but the MultiSound card has the same synthesiser engine.

The Sound Blaster 16 is fully compatible with Sound Blaster Pro applications and has the Sound Blaster proprietary CD-ROM



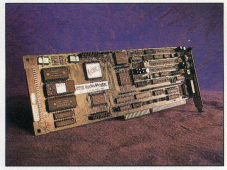
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interface built in. It has the usual features of auto dynamic filtering and allows mono files to be compressed to 4:1. The four-operator synthesiser uses the OPL3 chipset and produces very good quality sound.

AudioMaster

This $499 sound card picked up the Product of Show award at the Melbourne PC92 Show, and for very obvious reasons. It's a 16-bit card with a wavetable synthesiser, priced at no more than a 16-bit card with an FM synthesiser. It has an onboard 32-bit Motorola 68008 processor, good Windows and DOS applications, and even comes with a microphone.

Bundled in the $499 price is an optional FM synthesis card to provide AdLib sound compatibility. The full-length card has jumpers to select the I/O address, IRQ and DMA channels, microphone, stereo line-in and-out sockets, and MIDI port, as well as sockets for a CD-ROM interface and a RAM upgrade. The 384M standard RAM is used to store 128 instruments for the synthesiser, but it can be increased to 1.5M, allowing the storage of more complex instruments.



The AudioMaster card is based on a proprietary MediaMaster Sound Standard, developed by Integrated Circuit Systems and Advanced Strategies. The synthesiser uses an ICS 1399 chip, found in its EPS16 synthesiser. It has 24 voices and plays back files with 16-bit resolution and 44.1kHz sampling, but records at 12-bit resolution.

Wavetable lookup is a more sophisticated method of producing electronic sounds. The sound of each instrument is stored as a waveform shape that is based on a sampling of the instrument. The synthesiser looks up the wave, and then adjusts the pitch and volume of the sound. Instruments can have several waves, and the result is excellent-quality sound.

Card installation was the most troublesome of the group because the PC configuration must be tested before the card is installed — the reverse of most installation procedures — and my SCSI card's use of IRQ 11 confused the installation routine so much that a non-standard installation had to be carried out with the assistance of Omni Labs' technical support. Once in place, the AudioMaster delivered its goods. It played back the test files with great aplomb and had no impact on foreground applications.

The applications are mainly from Voyetra and are first class. For the Windows user, there's Jukebox, the best audio CD player of the group; Monologue for Windows (able to speak Clipboard and Excel files, as well as act as a DDE server application); WinDat; and a simple mixer applet.

For the DOS environment, AudioMaster bundles the latest versions of what are by now familiar applications. Version 5.0 of Band-in-a-Box sounds much better with the AudioMaster instruments, and the included version of Voyetra's Sequence Plus Jnr is better featured than other versions.



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Speakers on review

ScreenBeat $50

Computamart, which sells the Sound Blaster range of cards, also markets the ScreenBeat speakers. Attractively priced at just $50, they offer a modest 2W output and a frequency response from 50 to 15,000 Hz.

An amplified card will drive the two beige speakers, but to get any decent volume, each speaker requires four AA batteries to run. An optional AC adaptor would prove cheaper in the long run. The right speaker is connected to the left and brackets are available so that both speakers can be attached to the side of the monitor. They are shielded, so magnetic fields will not distort the screen.

Each speaker has a volume control and button to boost the base. Maximum volume is fine for the desktop, but not for a room. Sound quality is comparable to a portable radio, and without the bass button pressed, it sounds like a cheap transistor. Still, for $50, you can't expect much else.

Koss HD/2 Headphone $70

For users who do not want to disturb those in the vicinity, a decent set of headphones is essential. These Koss units are lightweight, comfortable and deliver pretty good sound. They are even coloured to suit the PC environment.

The connecting cable is long enough to allow you to move away from the PC. Volume must be controlled from the sound card's mixer.

With a 20 to 20,000 Hz response range, the HD/2 is almost up to the ear's sensitivity. Sound is balanced and neutral, and the overall effect is quite pleasant. At $70, the headphones are an affordable alternative to speakers that deliver less performance for the same money.

Digitor $75

Supplied by ACS, these jet-black, amplified speakers come with a set of tripods to raise them from the ground. These speakers have built-in 10W amplifiers, each powered by either four AA batteries or an optional mains adaptor. Each speaker has a front-mounted volume knob and buttons to boost treble and bass response. A handy feature is automatic power down when the speakers have not been used for a while.

The speakers are wired together and have a very long set of cables, which is necessary as they are not shielded and will distort the monitor image when placed next to it.

Raising the Digitors off the desk improves bass response, and they have enough volume for even the most enthusiastic gamer. Sound quality is surprisingly good, making the combination an excellent recommendation for the budget conscious.

Koss HD/1 Hard Drivers $90

These amplified speakers are similar to the ScreenBeat units, though a little bigger, better looking and requiring two C cells or an optional AC adaptor for power. Apart from a power switch, they also have a volume control, bass boost and a treble boost on the rear — a total of four controls per speaker!

Compared to the ScreenBeat, the 7.2W output produces more volume, though not enough to wake up the neighbours. A frequency response range of 50 to 20,000 Hz is not as good as that of the Koss headphones. The treble and bass boosts have a noticeable effect. Without them, the sound is flat and tinny.

Though they are shielded, there are no stands or monitor mounts with these speakers. The Digitors are a better buy all round.

Studio Pro $165

A few extra dollars will buy you these speakers from Omni Labs, the company behind the Audio-Master card. They are bookshelf-sized, PC beige in colour and solid performers.

Power is mains only. One speaker has an on/off switch, a power light bass, treble and volume controls. It is wired to the second speaker with enough cabling to get a reasonable separation. Each speaker has a small stand, improving bass response.

With a 20 to 2000 Hz frequency range, these speakers will almost match the human ear. At maximum volume, they will fill a small room, delivering a full, neutral sound that, while not up to hi-fi standards, will suit most PC applications very well.

Roland CS-10 $295

The neatest feature of this quality speaker set is that it fits right underneath the monitor. Mains-powered, the 5W Roland has a single-tone control knob, a headphone socket and two stereo input jacks on the rear. The two forwards-facing speakers handle treble tones, while the unit contains a downwards-facing 12cm woofer. Sound quality is first class, though sound separation was not as distinct as I would have liked it to be. As for volume, it can become as loud as you can bear.

The headphone socket is a great idea, as you can enjoy instant privacy. The design is excellent for those with little desk space, and the price is quite reasonable for the quality.

Sony SRS-D2K $349

With 19W of amplified power at its disposal, this trio of speakers brings any sound to life. A floor-standing woofer unit drives the bass sounds, while two satellite speakers sit on the desk. The combined frequency range is 40 to 15,000 Hz.

Volume, balance and tone controls are on the woofer unit. The sounds are nicely separated and the audio is hi-fi quality.

Connections for two input devices and a switch to select the input channel mean the speakers can also be used for a radio or tape player. The only criticism is that the satellite speakers are unshielded. Apart from that, this is a good musician's speaker.

Atlantic Technology Pattern $1000

At this price, you'd expect these Atlantic Technology speakers to be good — and they are. I used them as the reference for all the sound cards because they delivered exceptional performance. With 30W per channel, they're the type of speakers that manufacturers use to show off their sound cards at PC shows.

The Pattern combo is a three-piece stereo amplifier/loudspeaker system. The large bass module contains a power amplifier, while two satellite speakers deliver the higher frequencies. Because it is an amplified speaker set, it is suitable for the non-amplified MultiSound and Roland sound cards.

The bass/amplifier unit is quite large, but can sit comfortably under a desk or against a wall. It must be powered from the mains and can accommodate up to four sound sources; these could also be used for hi-fi or TV sound. It has a volume control and a bass level knob that can boost bass to foundation-rocking levels.

The satellite speakers are small enough to be positioned on either side of the PC. The top half of each satellite speaker rotates to allow different stereo effects. With a quality sound card, the Pattern speakers make PC music a pleasure and PC games an arcade experience.

Other applications include an excellent CD player, a jukebox that will play 10 tracks listed in a text file, the NotePlay tutorial and its companion program, RhythmPlay, a recorder, and a mixer. There's also a Sound Blaster-inspired parrot utility, which not only includes a parrot to talk to, but also a robot and a young boy. Linking the whole lot is an iconic interface, complete with a demo application that sounds off all the instruments available in the synthesiser.

In playing back music files, the AudioMaster's advanced synthesiser approach outshone all the cards so far discussed; its sound was more realistic and could be made more complex. This feature, together with the high standard of software, make it an excellent package.

The Word Is Out.

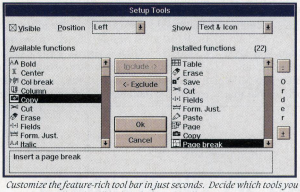
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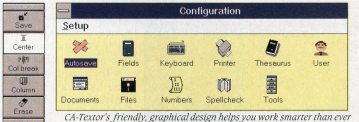
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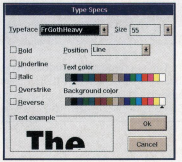
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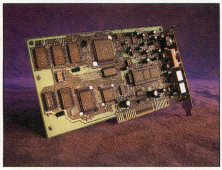
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Roland GS Sound Card SCC-1

Roland is well known in the field of professional music. Its $795 GS Sound Card is a professional musician's sound card, extending to MIDI and beyond. It's the heart of a range of MIDI components, from a keyboard to a pitch recorder, and, as a result, the card on its own is rather limited in what it can do.



The GS denotes a sound source format that is a superset of MIDI, designed to produce near identical sounds across any GS-compatible device. The MIDI standard has many undefined areas which are used in different ways by different manufacturers. When MIDI data from one device is played on another MIDI device, these proprietary extensions can ruin the sound, for example, by changing to a completely different instrument from the one intended. With GS instruments, if a tone is unavailable, the next best sound will be selected.

There is another difference as well. MIDI offers only 128 different tones, or instruments. With the GS format, there are 16,384 tones, and the GS Sound Card comes complete with 317 sounds, including nine drum sets and a set of special-effect sounds.

The card is a half-length device that is inserted in a free 8-bit slot. Dip switches provide a choice of four I/O addresses and six interrupt levels. At the rear, there are two mini-DIN MIDI connectors, a headphone jack and two RCA stereo output sockets. Cables convert the mini-DIN sockets to MIDI in and out ports, while audio leads convert the RCA sockets to 0.25in plugs for hi-fi devices.

The only software provided is a DOS utility that tests the I/O address and interrupt levels, then offers a menu of six MIDI programs. An option is also available that allows you to switch the card to MT-32 simulation mode. MT-32 is a Roland multitimbral sound-module sound specification. An MT-32 device can play through the sound card in this mode.

The Roland's sound capabilities are ably showcased by the demo songs. It can, in theory, play 24 voices at once, though many tones use more than one voice. Built-in routines will compensate for more than 24 voices. The 317 sounds provided include 128 main sounds covering every instrument in the orchestra or band, as well as ethnic instruments and synthesiser effects. Every part can have chorus or reverb effects added to it.

For drum effects, 128 drum sets can be selected, and the drum sounds only use one channel. Nine different drum sets, such as a jazz set, power set and orchestra set, are included. There's also an extended sound-effects set, including rain, car engines, laughing, screaming and sirens.

To really make the most of the Roland, you'll need software to create music, and perhaps a recording device (to sample sounds) or a MIDI keyboard. For the games player, there is a great deal of SCC-1-compatible software yet to come. However, the card will handle some game effects written

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to Roland's older LAPC sound-card specifications.

MultiSound

Undoubtedly the Rolls Royce of sound cards, the MultiSound has recently plummeted in price to an almost affordable $1395. When compiling this review, it was selling for around $1995.

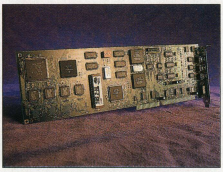
MultiSound was incarnated by Turtle Beach Systems, a Californian company with seven years' experience in PC audio. The MultiSound is an MPC-compatible card designed to suit the needs of the audio purist. It has 11, 22 and 44.1kHz sampling rates, 8 and 16-bit resolution, and supports stereo, which makes it better than most audio CD players.

It also comes with a built-in MIDI synthesiser that uses the E-Mu Proteus chipset found in the Proteus 1/XR synthesiser — a popular choice in the music business. The PC implementation has 16-bit samples of 126 CD-quality instruments stored in 4M of ROM, plus enough RAM to store another 384 sounds. The use of 16-bit samples, rather than FM synthesis to generate MIDI sounds gives top-quality results.

The MIDI interface has 16 channels, 32 simultaneous voices and only needs an optional MIDI cable to turn the PC into a professional musical instrument.

The MultiSound features a 20MHz Motorola DSP560001 digital sound processor. Rather than overload the PC CPU with processing, the DSP560001 takes care of almost all sound processing. It also has a proprietary 16-bit data-transfer architecture called Hurricane that's far more powerful than DMA transfer, allowing sound to be played simultaneously with the most CPU-intensive application, without missing a beat.

The MultiSound comes as a full-length, 16-bit card with three analogue stereo sockets (two input, one output) and a joystick port at the rear. Many of today's compact desktop PCs may have problems with fitting it, so check before you buy. It shouldn't clash with other devices, however, because there's a choice of nine port addresses and nine interrupt levels.

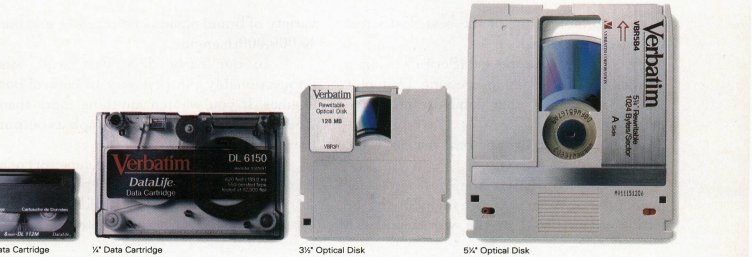


On the software side, the MultiSound comes with Windows MPC drivers, DOS drivers, a range of Windows sound utilities and 27 MIDI music files. To make changes to the Proteus functions, there is a Proteus front end. It is of little use unless you're using MIDI instruments. However, a CD-ROM mixer allows sound from a CD-ROM player to be mixed with files stored on disk, and there is an input-level meter to vary the input levels of different sound sources.

The most versatile meter is called Wave for Windows Lite. It is a cut-down version of a $195 sound-recording and editing program, Wave For Windows, which is used to edit the waveforms of recorded sounds. Up to four files can be opened at once, and sounds can be recorded, played back and edited using a mouse and a zoom function.

The MultiSound does not support popular game sound standards, though it can handle the sound from MPC-compliant CD-ROM games very well. If you want music, not sound effects, then opt for the MultiSound.

ALSO TAKE IT SEVERAL STEPS FURTHER.



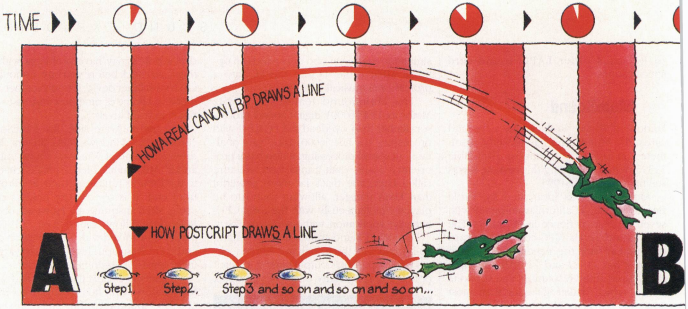
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If this sounds complex, you're right. PostScript needs considerable processing for your computer to define the image. Then it sends a large file to the printer, which must also be processed, before printing. As a result PostScript rarely prints quickly, particularly if your printer is short of memory. So Canon decided to invent a better way to control our engines.

We call it CaPSL™ III, for Canon Printing System Language third generation. It is a page description language, just like PostScript, except that it works far more efficiently thanks to internal outline fonts and vector graphics.

An outline font exists "as an idea" in the printer's memory. If you want to change its point size, make it bold, or change the orientation (say from portrait to landscape) CaPSL III just "stretches" the font, or rotates it. Each dot comprising the image doesn't need to be calculated and plotted.

Vector graphics takes the same idea further. Let's say you want a curved line to go from A to B. PostScript plots each point on the line to the resolution of the printer, for example 300dpi.

Vector graphics on the other hand allows the printer to receive a command that says "Start at A, Finish at B, and draw a curve in between."

Consequently CaPSL III can produce complex fonts and graphics far faster.

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Which brings us to the subject of money. If you need PostScript-like output, but want to keep costs under control, CaPSL III is the way to go. CaPSL III doesn't require an expensive processor, lots of RAM and a large hard disk. Any reasonable computer using everyday wordprocessing, spreadsheet or graphic packages can produce extraordinary output.

Nor does CaPSL III require expensive printer options. PostScript itself and extra fonts cost money. And to use PostScript at its best you need printer memory.

Since most other 8ppm machines offer only 512k as standard, you will probably need at least 2Mb, and preferably 4Mb. All of this costs money.

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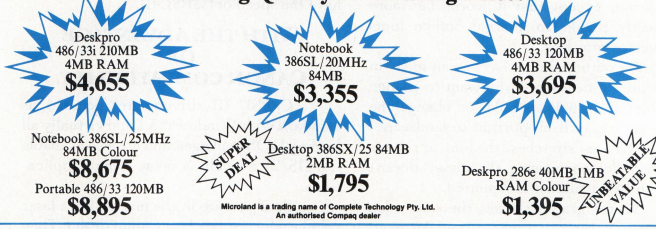
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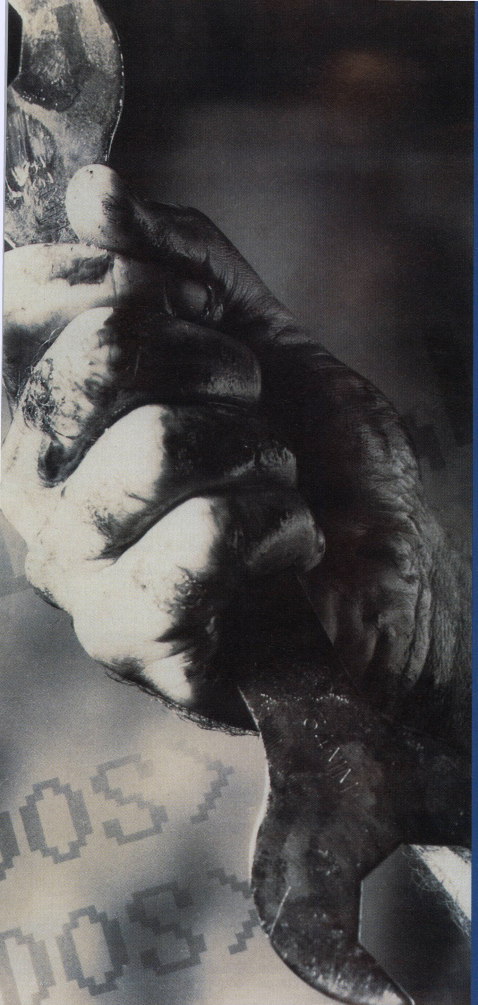
The myriad of SQL access tools available can easily have you shaking your head in bewilderment. Whether you need a dedicated tool for query or analysis, or an add-on to integrate SQL data with other applications, you'll find hundreds of choices.

SQL: THE SEQUEL

Front-end tools

BY JONATHAN ZUCK





In our last issue, we looked at SQL databases, those powerful engines on the server that store, protect and control access to a company's most valuable data. In this issue, we look at front-end tools – the client-side software that is used to access and analyse the data stored on the server.

There are literally hundreds of front-end tools from which to choose. In this article we'll give you an overview of the technology, along with reviews of some of the more interesting and innovative products.

The range of front-end tools

For the purpose of discussion, we have divided the range of SQL front-end products into three general categories: query and report tools, analysis tools, and development tools. In reality, the market is moving very quickly to blur these distinctions, but such groupings provide us with useful categories for evaluation.

There is one huge category that isn't represented in this breakdown: stand-alone applications with SQL hooks. There is a trend in the industry towards providing virtually any application that uses data with access to information stored in SQL databases. This includes applications as disparate as design tools (such as Autodesk's AutoCAD), spreadsheet programs (such as Microsoft Excel or Lotus 1-2-3) and standalone database systems (such as Borland's dBASE or Microsoft's FoxPro). In this article we review tools that are dedicated to accessing SLQ data.

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- Two 16-bit ISA-compatible slots

Memory:
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Standard Interface:
- VGA port with 512KB video RAM, supporting resolution of 1024 x 768
- Two serial ports
- One parallel port
- One game port





Kaiyo SL-200 SYSTEM

Processor:
- 80486SX, 25MHz

Disk Drives:
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- One 5.25" diskette drive (1.2MB)
- 3.5" IDE hard disk drive (80MB-200MB)

Expansion Slots:
- One expansion slot for plug-in slot card which horses two 16-bit AT slots

Memory:
- 4MB RAM standard, expandable to 128MB on board

Standard Interface:
- Local bus VGA port with 1MB video RAM, 1024 x 768 resolution and non-interlaced display support
- Two serial ports
- One parallel port
- One game port

intel inside

Kaiyo SL-300 SYSTEM

Processor:
- 80486DX, 33/50MHz (256K Cache)

Disk Drives:
- One 3.5" diskette drive (1.44MB)
- One 5.25" diskette drive (1.2MB)
- 3.5" IDE hard disk drive (200MB)

Expansion Slots:
- Seven 16-bit ISA-compatible slots

Memory:
- 8MB RAM standard, expandable to 128MB on board

Standard interface:
- Windows Asselerator Card with 1MB video RAM, 1024 x 768 resolution and non-interlaced display support
- Two serial ports
- One parallel port
- One game port



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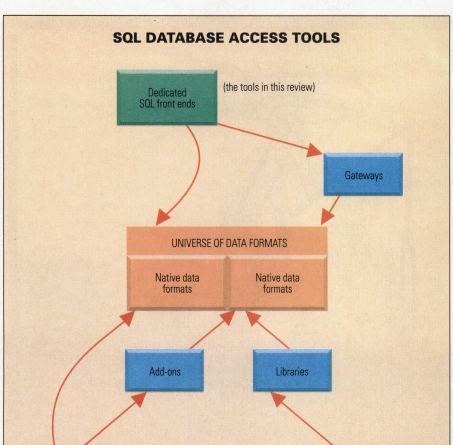
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The single most important consideration when choosing a front-end tool is which back-end engines it supports. There has been a race among vendors to have their tools support as many SQL databases as possible. At the same time, there has been a movement within the industry to adopt a standard so as to make the form of the data irrelevant (see the text box 'Transparent data access: cross-platform, cross-format' on page 101). This approach, however, risks falling prey to the lowest-common-denominator pitfall. Back-end vendors are constantly striving to distinguish their products by adding features that extend beyond existing standards. The real test of the emerging API (application programming interface) standards will be their ability to take advantage of the unique features of specific back-end engines.

Even today, with no standards in place, an important consideration when selecting a SQL front end is its 'awareness' of the back-end engine — the depth of its support for a SQL engine's unique features. For example, Sybase's SQL database engine includes a COMPUTE BY syntax. Many front-end tools cannot generate this statement or provide syntax checking for it. Further, some engines have unique data types, such as the BLOB data type for image data. When the front-end tool presents you with a list of data types, are special data types such as this on the list?

Query and report tools



Query and report tools provide a quick and easy way to generate queries and formatted reports. A key criterion when evaluating query and report-writing tools is their accessibility to the end user. How difficult is it for the average user (without any knowledge of SQL) to construct a query or report? Is the interface intuitive? Are the output options flexible? If certain SQL statements cannot be generated by the menu system (such as nested queries), does the user have the option of going in and actually writing SQL statements? Can the generated SQL code be tweaked to improve performance?

Some tools, such as ClearAccess for Windows, specialise in onscreen reporting

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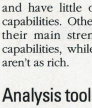
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and have little or no printed reporting capabilities. Others, such as Quest, have their main strength in their reporting capabilities, while their onscreen options aren't as rich.

Analysis tools



The products in this category extend beyond the bare minimum of retrieving raw data for viewing onscreen or on a printout. They massage raw data into useful information. The typical manifestation of such tools is an Executive Information System (EIS). Data is retrieved and then represented in an easy-to-understand format such as a graph or summary table. Often, there is some way to 'drill down' from a more general display to a more specific one.

For example, if a pie chart is displayed with the elements Products, Services and Investments, the user might be able to click on Products to see a graphical representation of the distribution of sales by product. This hierarchical analysis of data is the hallmark of most EIS systems.

Another strength of some analysis tools (including Forest & Trees for Windows) is their ability to update the currently displayed data periodically via timed or event-driven queries. Forest & Trees can also set 'alarms' that are triggered when certain conditions are met in the data. For example, if you need to know when a stock price drops below a certain cutoff, you could set an alarm that would colour-code the data in red.

Most analysis tools have the ability to access and integrate information from a variety of sources — various SQL engines and different file formats — for analysis and presentation as a single unit. ClearAccess and Forest & Trees both provide this capability. Pilot Software's Lightship can only access one data source at a time and cannot integrate the result sets, although the result sets can be displayed simultaneously.

Development tools



There are three main types of SQL front-end development tools: SQL connectivity libraries for use with traditional programming lang- uages such as Basic, C or COBOL; stand- alone versions of SQL database engines; and the new crop of dedicated SQL front-end builders. (See the text box 'Standalone SQL engines' on page 96 for discussions on these products.) In this roundup, we review a sampling of the many front-end development systems available today.

Most dedicated SQL front-end development tools employ an event-driven procedural language. Forms are designed graphically using visual objects and non-object-oriented code attached to these objects to handle various events. All the tools support simple events, such as entering a field or clicking a button, but the tools differ in the quantity of events they support and the degree to which they can be expanded.

Matesys' ObjectView supports a strong function set, but provides no way to extend the environment to support new events, while Powersoft's PowerBuilder (which also supports an impressive array of functions) allows you to add new events by trapping Windows messages; PowerBuilder also allows for the creation of aggregate 'user-defined' events.

ObjectView was the easiest program to master in the selection reviewed, but it also comes with the fewest high-end tools and the least flexibility. PowerBuilder succeeded in taking the middle road by providing users with both flexibility and ease of use.

Because the query, report, analysis and development tools we reviewd are divergent, it did not make sense to perform benchmark tests. And since this is an article based on technologys rather than a comprehensive roundup, we did not award an Editors' choice.

Our goal is to provide you with an overview of the types of tools available to developers, along with in-depth reviews of the more interesting and innovative products in each area. The reviews that follow should make the world of SQL databases a little less confusing and the task of choosing a SQL front-end tool a little less daunting.

ClearAccess for Windows



Version 1.0 of ClearAccess for Windows, from ClearAccess and distributed locally by Conexus, is a query and report tool that can serve as a data link between a SQL back end and any Windows application that supports DDE, such as Microsoft Excel. The package allows users to easily design complex nested queries through a menuing system; queries can be stored as scripts with prompting. Its ad hoc query capabilities are easy to use — end users won't even know they're working with SQL processes — and can be stored for re-use through script recording. There's also a Macintosh version of ClearAccess,

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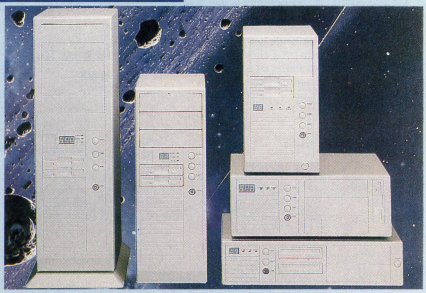
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AT A GLANCE

ClearAccess for Windows, Version 1.0

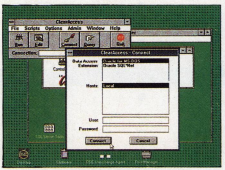
Distributor: Conexus
Telephone: (02) 975 2799
Price: $569
Requires: 400K of RAM, 1M of hard disk space, Microsoft Windows 3.x
In short: ClearAccess, an easy-to-use Windows program, can create ad hoc queries of surprising complexity. Its scripting and DDE capabilities make it an excellent tool for creating links between a database server and other Windows applications.

and the same ClearAccess scripts will run on either platform.

Version 1.1 (to be released soon) adds support for Information Builders' EDA/SQL, which gives connectivity to a large number of databases, including SQL databases from Ingres, Microsoft, Novell, Oracle and Sybase, as well as some non-SQL databases. For temporary storage of large amounts of output from a query, there's a local database repository called ClearBase.

Unique query abilities

ClearAccess' main screen contains a five-icon toolbar that gives users the choice of running a script, editing a script, connecting to a database, querying the database or quitting the program.



ClearAccess for Windows' main menu is a small icon bar. Clicking on the Connect icon brings up a screen that lets the user access local or remote databases

Pull-down menus offer similar choices, as well as commands for starting and stopping the script recorder, and for creating a predefined join of data from different tables.

The query window is the heart of ClearAccess. Once a connection is established to a local or remote database, the query window presents lists of all the accessible tables in the database; when a table is chosen, the columns in the table are displayed in a second window. Queries are built by clicking on the necessary columns and dragging them to a window on the right-hand side of the query screen. The conditions and sorting options for the query are then chosen and entered. ClearAccess has the unique ability to generate nested queries from a menu, without the user having to write any SQL code. Other query options let the user format the results, create joins and edit the various conditions prior to running the query.

The results can be returned to the screen or to the Windows Clipboard. They can also be saved to a file in comma or path-delimited ASCII, SYLK or .WKS formats for importing into other applications. Results from different databases can be joined by storing the different result sets in a local ClearBase database and creating a join on the local tables. Or the result sets can be sent directly to the Clipboard for manual or automatic pasting into another Windows application.

Scripting power

ClearAccess' power lies in its scripting capabilities. The scripting language has over 50 commands that provide broad functionality. For example, it lets the developer prompt the user for values during script execution so that ad hoc queries can be created and run through scripts.

Scripts can be created by recording an ad hoc query or via a text editor. Existing scripts can be edited through the built-in editor and run from the main menu. Simple debugging is supported that lets the developer pause scripts during execution or watch the actual dialogue between the script and the database server in a separate window. Scripts can be stored on either the server or the client.

The ClearLinks module, bundled in the package, acts as a direct automatic query link for Microsoft Excel and other Windows applications that support DDE. ClearLinks adds another 27 scripting commands that control the DDE functions and let ClearAccess act as either a DDE client or DDE server. Other Windows applications can be started and stopped by a ClearAccess script, which lets the developer completely automate the process of querying the database and moving the results directly to another application for reporting or analysis. Excel is supported directly through an included add-in document that lets Excel macro sheets directly access and run ClearAccess scripts to query databases. A floppy disk bundled with Version 1.0 (the feature is incorporated into Version 1.1) adds links to Informix Software's Wingz and Microsoft's Visual Basic.

ClearAccess is an excellent tool for creating and running ad hoc queries from a wide array of data sources. The best way to use it, however, is as a linking application: its strength lies in its ability to automate database access and automatically pass the results to other Windows applications for further reporting or analysis.

Joe Salemi

Quest



Gupta Technologies' Quest, Version 1.2.0, a Windows-based query and report tool, uses dialogue boxes to insulate the user from the underlying SQL code. It has built-in functions to help analyse data, and can be used to pass query results to other programs for further analysis. Report tools are its greatest strength; its biggest limitation is the lack of a charting function.

The single-user base package includes a standalone version of Gupta's SQLBase Server, along with networked Gupta database connectivity. This lets the user work from a local database for development instead of being tied to a network. Access to other SQL back ends is provided through routers and gateways sold separately by Gupta. An interactive SQL window is available for those who prefer typing in their queries directly or who need to carry out nested SELECT queries. Gupta also sells SQL Windows, which includes free runtimes, a report writer and the SQLBase engine. Through add-on gateways and routers, SQL Windows can connect to Gupta, AS/400, Hewlett-Packard, IBM, Informix, Microsoft, Oracle and Sybase SQL databases.

Menu-driven queries

Quest uses menus to shield the user almost entirely from SQL. A series of dialogue boxes, pick lists and menus leads the user through the process of developing the query. Quest doesn't directly support joins or views from multiple data sources, since it can only access one database at a time. The only way to create multidatabase joins is to query each database and save the results to a local database. Joins can then be

Summary of features: SQL front ends

In alphabetical order by category ● — Yes ○ — No N/A — Not applicable: the product does not have this feature	Query and report tools		Analysis tools		
	ClearAccess for Windows	**Quest**	**Forest & Trees for Windows**	**InfoAlliance for Windows**	**LightShip and LightShip Lens**
List price	$569	$1195	$920	P.O.A.	$1545
Formats supported					
SQL engines from:					
Gupta	○	●	●	○	●
IBM	●	●	○	●	●
Ingres	●	○	○	○	●
Microsoft	●	●	●	●	●
Novell	●	○	●	○	●
Oracle	●	●	●	○	●
Sybase	●	●	●	○	●
XDB	○	○	○	○	●
Client platforms:					
DOS	○	○	●	○	○
OS/2	●	○	○	●	○
Windows	●	●	●	●	●
Can act as DDE client	○	●	●	○	●
Can act as DDE server	●	●	●	●	○
Data sources					
Accesses multiple sources in one query	●	○	○	●	○
Integrates and displays data from multiple sources	○	●	●	●	●
Joins tables from multiple sources	●	○	○	●	○
Schedules queries for automatic updates	○	○	●	○	●
Updates server database	●	●	○	●	●
Updates multiple databases at once	●	○	○	○	●
Programming					
Constructs queries from menus	●	●	●	●	●
Constructs nested queries from menus	●	○	●	○	●
User can view constructed SQL code	●	●	●	○	○
User can edit generated code	●	●	●	○	○
SQL syntax help online	●	●	●	○	○
Native programming or scripting language	●	○	○	○	●
Debugging features:					
On-the-fly syntax checking	○	N/A	N/A	N/A	○
Allows testing of application under development with existing package	●	N/A	N/A	N/A	●
Traces through program	○	N/A	N/A	N/A	○
Application distribution,					
Distribution requirements	N/A	N/A	N/A	DLL runtime module	DLL runtime module
Free distribution	N/A	N/A	N/A	●	○
Technical support,					
Free technical support	Through dealers	90 days	None	90 days	90 days
Toll-free number available	●	○	○	○	○

	Develeopment tools	
	ObjectView	PowerBuilder
	$1599	$4200 to $9000
	●	●
	○	○
	●	○
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	●	●
	●	●
	○	●
	DLL runtime module	DLL
	●	○
	90 days	30 days, depends on nature support
	○	●

AT A GLANCE

Quest Version 1.2.0

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Price: $1195
Requires: 286-based PC or better, 2M of RAM, DOS 3.1 or later, Microsoft Windows 3.x
In short: Quest is a Windows-based query and reporting tool that insulates the user from needing to learn SQL. While it can also pass data gathered in queries along to other Windows applications for further analysis, its greatest strength lies in its report writing

done on the resulting tables in the local database. In order to access multiple data sources at once, the user has to start multiple instances of Quest and access a different database in each.

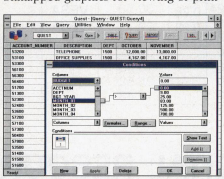
For further data manipulation, Quest provides maths, string, date and time functions that are accessed through dialogue boxes. These functions can be used to create new columns in the result set to enhance analysis of data returned from a query. Once built, queries can be saved on the client machine for re-use. Quest can also serve as a Windows DDE (Dynamic Data Exchange) client or server, which allows it to pass query results to another Windows program for analysis or charting. Quest has no built-in charting facility, but instead relies on links to applications such as Excel through DDE.

A capable report writer

Quest's greatest strength is in its reporting capabilities. Reports are based on existing saved queries or local database files. Reports can be designed via the full-screen report painter, or dialogue boxes can be used to set the report size and format. Either method gives access to options that include adding graphics borders to fields, controlling blank lines and printing different fields in different fonts. Dialogue boxes can be used to import bitmapped graphics for viewing or printing. Reports can be viewed on screen prior to printing.

Quest has sets of aggregate and non-aggregate functions for massaging data within reports. The aggregate functions provide the user with statistical functions such as minimums and maximums, sums, and data counts. The non-aggregate functions are string functions for extracting portions of text fields or converting fields between numeric and text formats. Quest's reporting functions also make it easy to create mailing labels or form letters that use the data in a database to fill in information.

Quest is a strong tool for creating queries and reports on SQL databases. It has no native programming language, but it can be indirectly programmed through DDE links to Microsoft Visual Basic programs or through macro languages such as those in Microsoft Excel or Word for Windows. Its lack of charting and limited analysis functions are compensated for by its DDE capabilities, which let it act as a query engine for other Windows applications. Quest is a good choice for those who perform most of their work in Windows.
Joe Salemi



Quest uses a series of dialogue boxes, pick lists and pull-down menus to build SQL queries from either a single table or linked tables

Forest & Trees for Windows



Channel Computing's Forest & Trees for Windows Version 2.0d is a powerful analysis tool. The standard version lets users combine and analyse data from common PC file formats, including dBASE, Lotus 1-2-3, Microsoft Excel, Q&A, R:BASE and Paradox. Data can also be brought in through Windows DDE (Dynamic Data Exchange) links. The client/server version can integrate data from a wide array of SQL databases. Forest & Trees, which is often used to create Executive Information Systems (EIS), is strictly an analysis tool; it doesn't allow users to modify data.

Forest & Trees offers many users ways of accessing their data, but its best feature



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EM-916	9"	Mono VGA	800 X 600		35.52	
EM-912	9"	Mono TTL	720 X 348		18.43	



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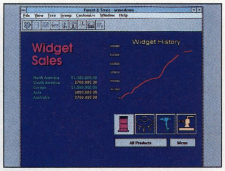
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AT A GLANCE

Forest & Trees for Windows Version 2.0d

Distributor: Ipex Information Technology Group
Telephone: (03) 242 5000
Price: $920; client server edition, $2000
Requires: 2M of RAM, 6M hard disk space, Microsoft Windows 3.x
In short: Forest & Trees, a data access and analysis tool, allows users to combine and examine data from a variety of sources. Its many unique end-user features makes it an especially appealing product for Executive Information Systems applications.



Forest & Trees for Windows can monitor data thresholds in real time; and can also save a log of data prior to updates

is its use of a tree metaphor in collecting data from various sources into data objects on the screen. With this feature, each object is a node in the tree diagram and contains the results of a query of a particular data source. The objects can then be analysed and combined to create higher-level nodes. All the nodes ultimately connect to a root-level node that contains the summary analysis.

A working metaphor

Perhaps the easiest way to describe how Forest & Trees presents complex data for analysis is by example. Suppose a business owner wants to analyse cash flow. The first step would be to query relevant data sources to build a tree with all the components of cash flow; each branch terminates in a node which contains the result set from a query on a different source. Once these lower-level nodes are created, the user can then create higher level nodes by combining the lower level nodes — for example, one node for income and one for money spent. Finally, the branch nodes could terminate in a root node where expenses are subtracted from income to show the company's overall profit or loss.

Each node's display object has a set of button icons that let the viewer navigate the tree to examine different data elements, create a graph or report on the data the object represents, or add pop-up notes to a node.

Another way to navigate is by using the mouse and on a data object. Data can also be brought in and analysed screen by screen, but it's the 'tree' that makes this product unique.

Alarms and schedules

Forest & Trees provides the ability to update data on screen in real time. This feature is built into a Forest & Trees application via a scheduling tool, which determines when the data in an object is updated. Automatic updating can take place after an end user-defined period of days, weeks or months. If the application isn't running during a scheduled time, the updates are automatically performed the next time the application is loaded. In contrast, other packages (including LightShip, which is also reviewed in this roundup) require the developer to set up the scheduled events in advance.

Forest & Trees can also save a log of data prior to updates, which lets the user view and analyse the changes in a particular data object over a period of time. This feature is useful for tasks like examining the balance on outstanding invoices.

An alarm feature lets users easily monitor the levels of critical variables (say, for instance, inventory) by colour-coding the data displays. Green indicates the level is satisfactory, yellow means the quantity is approaching a cautionary level, and red means the data has triggered the alarm. Pop-up notes can be attached to the alarm to provide information on what the alarm indicates. This is a particularly powerful feature when used with the real-time updates.

Forest & Trees is simple enough for the novice to use efficiently, yet powerful enough to perform complex analyses. Its data analysis capabilities are among the best we've seen. If you need a user-friendly but powerful analysis tool that can integrate data from many different sources, you'll want to take a look at Forest & Trees.

Joe Salemi

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Standalone SQL engines

SQL database systems built on the client/server model are generally used on networks. The database engine resides on a server, and the front-end access tools reside on client workstations. While a network is the perfect environment for a system that's up and running, it can be less than ideal for development work. A standalone engine such as the popular DOS version of XDB spells relief during the development process on a number of fronts.

Many things can go wrong during the development process. At the very least, as tables are being normalised and optimised, there is heavy access to the server, which can compete with other client applications. Under the worst circumstances, bad queries generated during development could tie up the server and cause work disruptions elsewhere on the network.

Another consideration is the mobility of the development process. It's inconvenient for programmers to be tied to a network for development. With a standalone engine, development can also take place at home or on the road.

Standalone engines are not strictly for development; they can provide a powerful vehicle for local data access. Even when the data is not shared by multiple users, there are data-management and integrity benefits to be gained from accessing data via an engine rather than the files directly.

With the advent of multitasking on single-user machines, it is possible to have more than one application accessing the same data at once. Concurrency is handled better by a central processing engine than by competing applications.

There is also a scalability benefit to standalone SQL engines. In some situations, it's useful to be able to run a networked database application on a local PC; standalone engines can provide this scalability. For example, a salesperson might need to download contact data to a notebook computer and access the data on the road. The ability to run the same application on the network and on a notebook can be a major time convenience.

Finally, although they're called 'standalone engines', these products can usually support multiple users over a network using the file-server rather than the client-server architecture. Although it is inefficient, it can be an inexpensive way to get a networked database up and running before investing in expensive client-server hardware.

Three variations on the theme

Standalone engines can take three different forms. One common form is as a set of static link libraries (.LIB files); there are versions for both DOS and Windows. For example, Ocelot's Ocelot2 — The SQL! comes in the form of a .LIB file that is linked into your final executable. This method has the advantage of limiting the number of files that must be distributed with the application. Also, because the linker extracts only those modules needed by the program, the total memory required is minimised.

Another possibility is to use a DOS-hosted engine that runs as a TSR on the client workstation and is accessible via interrupts. This method more closely mimics the networked architecture. The standalone versions of Gupta Technologies' SQLBase Server NLM and Oracle's Server for NetWare engines are two examples. In both of these products, the developer is shielded from direct interrupt calls via a library of alias functions that match those found in the client-server version of the engine. The primary benefit of this approach is smaller executables.

Finally, under Windows, standalone engines such as Quadbase-SQL/Win are shipped in the form of DLLs (dynamic link libraries). This offers several advantages, including simultaneous multiapplication support and asynchronous queries.

Which should you choose?

The standalone SQL engine you need depends largely on whether you need to develop an application that will ultimately run on a network in a client-server configuration, or one which will be used to access local data on a PC.

If you plan to move your application to a network, then upwards scalability will be your prime consideration; the API for the standalone engine should be as similar as possible to the API for the networked version. To this end, a growing number of SQL back-end vendors now sell standalone versions of their database engine for DOS and Windows development. There are standalone engines from Gupta, Ingres, Oracle and XDB. (There is not yet a standalone version of Novell's most recent release of NetWare SQL.)

Third-party products are a good choice if you intend to develop for multiple database formats and back-end engines, or if you don't need the power of the client-server architecture. Ocelot2, which is available for both DOS and Windows, is one of the smallest and fastest standalone engines, especially when the precompiler is used. Ocelot2 also provides a high level of DB2 compatibility, second only to XDB, which is a much slower performer.

Perhaps the most powerful standalone engine for use under Windows is Quadbase-SQL/Win. It's fast and flexible, with powerful concurrency and network support. Both of these products are especially well suited for standalone or file-server applications.

Q+E Database Library from Pioneer Software, which supports numerous back-end formats, uses a proprietary API for accessing data. This lets Database Library provide fuller access to back-end feature sets. While it is especially good at multiformat data access, its standalone performance is not as strong as that of Ocelot2 or Quadbase.

Jonathan Zuck

LightShip and LightShip Lens



LightShip, Version 3.01, a Microsoft Windows-based data analysis package from Pilot Software, is primarily designed for creating in-house visual analysis applications, especially EISs. The single-user version uses Windows' DDE facility to acquire and display ASCII and Windows-based data. The LightShip Lens module provides LightShip with access to PC-based databases such as Excel, Paradox and Xbase, as well as SQL databases from Microsoft, Novell, Oracle and Sybase. Though users can use LightShip to update information in source files, the package's primary function is to provide a tool for visually analysing database information.

Click and create

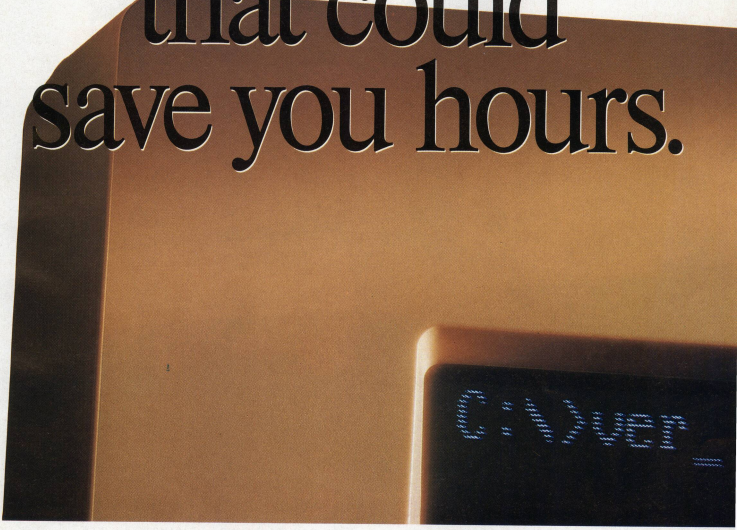
LightShip uses a visual development environment with tools to create screen and data objects. The basic package can use directly entered data, a text file or a Windows DDE link as data sources. The Lens module, needed to gain access to other data sources, is automatically invoked as a data source when a new document object is created.

Data objects, which display data from a single source, can be placed anywhere on the screen. Unlike Channel Computing's Forest & Trees, which can combine data from disparate sources, the only way to compare data from different sources with LightShip is to create an object for each source and manually compare them.

LightShip guides the user through query formation via pop-up windows and pick lists for specifying the data source, fields of interest, and query conditions. Developers can designate screen objects as 'Hot Spots' and assign actions to them. Clicking on a Hot Spot allows users to 'drill down' through the selected data object, viewing documents associated with that particular item in a separate window on the screen. A Hot Spot can also be used to perform actions such as calculations.

With Lens loaded, users select the appropriate query conditions from a menu and the SQL code is automatically

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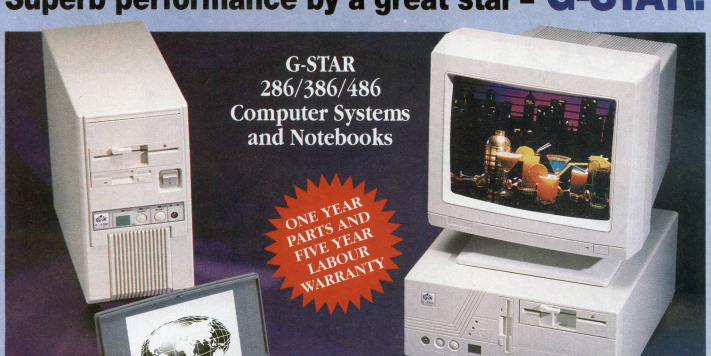
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FLOPPY DRIVE	1.2 + 1.44	1.2 + 1.44	1.2 + 1.44	1.2 + 1.44
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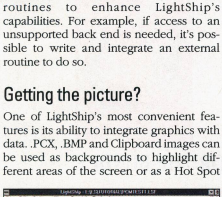
LightShip Version 3.01 and LightShip Lens Version 3.0

Distributor: EPS Software
Telephone: (02) 975 2380
Price: LightShip, $1250; with Lens, $1545
Requires: 2M of RAM (4M is recommended), 5M of hard disk space, Microsoft Windows 3.x
In short: LightShip is a development tool for creating EIS. Its strengths lie in its visual analysis and graphing capabilities; LightShip's greatest weakness is that only one data source can be accessed at a time.

generated. While it is rarely necessary, experienced users who wish to bypass the menus can do so. LightShip also provides hooks for developers to write external routines to enhance LightShip's capabilities. For example, if access to an unsupported back end is needed, it's possible to write and integrate an external routine to do so.

Getting the picture?

One of LightShip's most convenient features is its ability to integrate graphics with data. .PCX, .BMP and Clipboard images can be used as backgrounds to highlight different areas of the screen or as a Hot Spot indicator. LightShip also gives the developer complete control over the screen palette; colour can be used to highlight blocks of data or sections of a window.



LightShip's object-orientated development environment allows the application developer to combine data and graphics for visual analysis

Bar, line, area and pie charts are available; users access the pertinent information, select the data they wish to see, and describe the chart in a dialogue box. Charts showing information from different areas of the same database may be overlaid for easy comparison.

One of the important EIS-type features included in the product is variance reporting. You can set up a reporting system that allows users to set thresholds at which data values should be displayed differently. For instance, an inventory ledger might show understocked products in a different colour. This capability is different from a true alarm function (such as that in Forest & Trees) because it doesn't automatically pop up an alert; instead, alerts must be explicitly coded by the developer.

The package includes debug facilities that let the developer test run the application while tracing the values of defined variables and the actions being executed. Traces can be printed or saved on-disk.

LightShip's biggest drawback is that it cannot create links between different data sources for analysis; the one-file limit is a severe restriction. Still, its simple, visually oriented approach makes it a useful analysis tool.

Joe Salemi

InfoAlliance for Windows

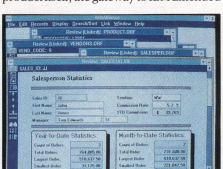


Software Publishing's InfoAlliance for Windows Version 1.10 is billed as a 'data-source integrator'. Its primary function is to give users a way to integrate and examine data from multiple sources within a single data view or report. To that end, InfoAlliance users can access data from its own OS/2-based server with its proprietary data format, or they can have transparent access to IBM Extended Services, Microsoft SQL Server and Xbase databases. Data can also be imported from ASCII, Lotus 1-2-3 and Professional File file formats.

InfoAlliance front ends (clients) are available for OS/2 1.21 or later and Windows 3.x. The OS/2 version requires InfoAlliance software on both the front end and back end; the Windows version, reviewed here, can be installed as a standalone client.

A modular approach

In its entirety, InfoAlliance is a system that consists of three modules: the front-end product itself, the gateway to IBM Extended



The modular, form-based interface of InfoAlliance for Windows is capable of showing information from multiple data sources

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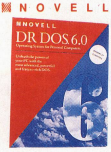
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Transparent data access: cross-platform, cross-format

With the growing popularity of SQL databases on virtually every platform imaginable, the use of proprietary APIs (application programming interfaces) for data access and manipulation presents a growing problem. A front-end program developed for use with one vendor's back-end engine cannot be used with that of another, and application developers must spend costly time learning many variations of the same thing.

Transparent data access — the ability to access multiple back ends from a single front end — provides numerous conveniences, but it's important to recognise that this is not a perfect solution. It is next to impossible to create an application that is optimised for more than one SQL back end. For example, if you were using IBM Extended Services, you would want to take advantage of its OS/2-based DLL (dynamic link library) capability, but you won't find this feature elsewhere.

The components of an API

An API is nothing more than a syntax (a standard set of functions) that is used by developers for a particular task. An API used to access SQL engines is a set of functions that standardise communication with SQL back ends. With the exception of precompiling, the API has little or nothing to do with a particular SQL dialect, but rather the manner in which SQL is passed to the engine and results are retrieved.

For example, one engine might have a three-parameter function called dbEXEC for sending SQL commands to the engine. Another engine might have a function with a similar purpose called SQLRequest that takes two parameters. In the case of the function with the third parameter, results (perhaps only partial) will be retrieved as part of the call to send the SQL statements. With the other function, though, a separate call is required to retrieve results. These seemingly minor differences can cause a great deal of frustration if you're a developer attempting to build a back end-independent application.

The simplest way to achieve transparent data access is to connect to the same vendor's SQL engine on different platforms. This is relatively simple because the API remains the same and only the platform changes. Vendors that provide versions of their products for multiple platforms (and most do) generally provide communications software for accessing data stored on other platforms. A company that uses one vendor's SQL engine on all of its computers will have an easier time integrating its databases than a company which uses products from multiple back-end vendors.

The reality, however, is that most companies use software from more than one vendor. A company's database software is usually purchased piecemeal over time rather than with an overarching grand plan, and most companies do not have the luxury of throwing out their existing software to adopt a new, standardised system on all platforms. In general, transitions to new database software are made incrementally, if they are made at all.

The gateway solution

Gateways, software that provides transparent access to the database engines of many vendors, are sometimes developed by database vendors themselves in an effort to bring more developers into their fold. Gupta Technologies builds gateway features into its engines that enable developers to write to Gupta's SQLBase API, but specify that these calls should be 'passed through' to another SQL engine.

Most gateways, though, are provided by third-party vendors. Micro Decisionware has chosen the Microsoft/Sybase dbLIB API as the API of choice for mainframe connectivity. Using Micro Decisionware's DB2/-Gateway, it is possible to move an application to DB2 or another format without even recompiling your code! It operates by intercepting calls to dbLIB and translating them to calls to the host system.

Standardising on an existing API is a good approach because then at least one engine's features will be fully accessible. But there are cross-format advantages to using a non-dedicated API. Pioneer Software has developed a proprietary API for accessing an enormous number of SQL engines and non-SQL database formats. Its Q+E Database Library is available under Windows and OS/2.

Enterprise Data Access/Structured Query Language (EDA/SQL), from Information Builders, also provides its own API and drivers. But this vendor aims its marketing efforts at companies developing data-access tools, rather than at individual developers. Information Builders has reached agreements with Apple, IBM and Microsoft, among others. The goal is to provide a uniform, relational view of data, regardless of its source or organisation. While many gateway products support multiple back-end platforms, EDA/SQL is unique in the number of front-end platforms that support it.

SQL access standardisation

If Information Builders or Pioneer had the marketing muscle to pull it off, one of their products might become the model for transparent data access. As is natural with such things, however, the emerging standards for SQL engine access are coming from the big guys: Microsoft and Borland. Rather than evolving from an actual product, these committee-designed standards exist only on paper. It will be the responsibility of each vendor to create compliant software.

Microsoft's proposed standard is called ODBC (Open Database Connectivity); the Borland version is called ODAPI (Open Database Application Programming Interface). ODBC has been more fully specified at this time than ODAPI and is dedicated to SQL, while the more ambitious ODAPI standard is further off but intended to support non-relational data access and object-oriented database technology. Both specify standards to provide the following:

- A set of standard function calls (an API) to allow applications to connect to a database management system, execute SQL statements and retrieve results. It would be the responsibility of each engine vendor to release a driver that complies with the standard. The drivers will take the form of 'wrapper' libraries that translate the vendor-specific calls into the standard API. This will preserve the utility of existing applications that call the old API.
- A specification of SQL syntax and supported data types. One of the major requirements for successful cross-engine interoperability is the standardisation of SQL language components. This will probably be the greatest stumbling block to transparent data access because of the need to preserve existing functionality.
- A standardised set of error codes and standardised error-handling procedures and behaviour.

If the computer industry as a whole accepts one of the standards, the number of applications supporting access to SQL databases will mushroom. Providing access to so many different standards is a developer's nightmare; a single API would greatly ease the task.

Jonathan Zuck

Services and Xbase, and the SQL Server connection. The front-end module provides a host of forms-based tools that let the user create and use data forms that can contain multiple fields from multiple databases. The forms are based on Info-Alliance database 'views', which can link tables from any of the different data sources into a single view.

Forms and reports begin as a data view that gets built up through dialogue boxes, menus and pick lists; data fields in the view can come from any of the supported data sources. The form or customised report is then designed using the fields in the view through the graphical full-screen painter function. Quick reports can be easily created from an existing form, and

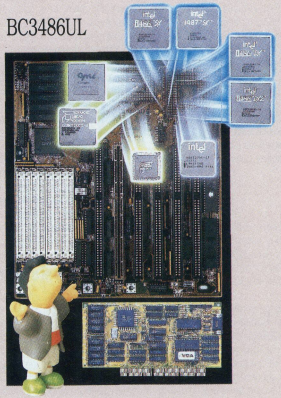
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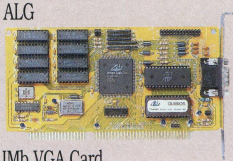
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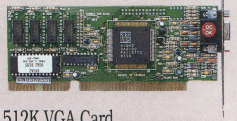
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InfoAlliance includes a number of predefined standard mailing-label formats.

There are no built-in charting functions, but InfoAlliance can export data in the Harvard Graphics format for charting LANs. While it ups the price of InfoAlliance dramatically, the module is the only way to gain access to databases other than Microsoft SQL Server.

The NDSI server supplies user log-on security through user IDs and passwords, which are managed by the included OS/2 or Windows server administration program. The administration program also lets the database administrator monitor server activity, such as the number of open files and which files are being accessed by which users.

A third module (the newest in the group, and required only if you need to access SQL Server) is called the Connector to SQL Server. It runs either with a standalone InfoAlliance Windows front end or as part of the NDSI server to give multiple users access to SQL Server data. The Connector handles all the translations to make SQL Server databases appear as InfoAlliance databases to the users; it also has the ability to copy the SQL Server data to any of the other supported data sources. InfoAlliance's Connector even gives the user the ability to create multiple views from tables residing on different SQL databases, integrating the different tables into one form or report.

AT A GLANCE

InfoAlliance for Windows Version 1.10

Distributor:	Software Publishing
Telephone:	(02) 418 7188
Price:	Price on application
Requires:	386SX-based PC or better, 4M of RAM, 5M of hard disk space, VGA display, Microsoft Windows 3.x
In short:	InfoAlliance provides the ability to access data from multiple sources simultaneously, including from its proprietary client-server back-end. No programming is required to create comple applications.

Protecting users from code

The InfoAlliance development environment shields users and developers from having to write program code; in fact, there's no programming or script language at all. Unfortunately, applications are stored in a proprietary format and cannot be created or edited outside of InfoAlliance. The application file format, however, is compatible with both OS/2 and Windows versions.

InfoAlliance uses Windows' GUI capabilities to the fullest. Bitmapped graphics can be included in a form or report, and different sections and fields can be set apart from others with different fonts and colours. Data can be viewed and manipulated through either a form or a table window, and multiple data windows can be open at the same time, which lets the user cut and paste data from one table to another for queries or updates.

InfoAlliance's greatest strengths lie in its native client-server abilities and its ability to integrate data from a number of different sources into one view for analysis. It's an excellent choice for those who already have large databases in a number of different formats and want to be able to combine data from those databases without having to convert them all into a single format.

Joe Salemi

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ObjectView



ObjectView, Version 1.10, an early player in the SQL database front-end market, is a Windows and OS/2 development tool known for its ease of use and speed, as well as the flexibility the developer is given in building the user interface. ObjectView was introduced over a year ago (Version 2.0 is due soon), but it is still the tool of choice for applications that require non-standard interfaces or unusual functionality. Its multilanguage support, while costing the product a certain degree of integration, provides flexibility.

Building the user interface

ObjectView is based on a powerful screen painter with tools for building complex user interfaces. You can select from a list of interface objects (also called 'controls') using either a toolbar or a menu. The list includes standard Windows controls as well as enhanced ones. Some Windows controls are not fully supported; for example, ObjectView provides list boxes but lacks the ability to create multi-select lists. The enhanced controls, however, are impressive: geometric objects that can be used as buttons; a picture control that supports transparencies, .BMP, .PCX and meta files; and edit fields with masks, validations, help and calculations.

The most impressive enhanced control in ObjectView is the Table Object. This spreadsheet-like grid is fast, flexible and loaded with features: column and row formatting, picture cell support, and file operations, to name a few. The generated display is entirely dynamic, expanding and contracting to accommodate the result sets displayed. But it is limited in that cell calculations are only available through database functions.

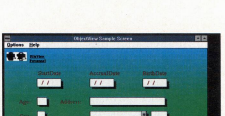
Once the screen is built, the developer selects actions to associate with each control. There is a set of over 60 built-in high-level controls, including file access, database access and DDE requesting. These macro commands are mainly useful for fast and painless prototyping; since they are quite limited, few will end up in your completed application.

For more complex control actions — when you need to associate multiple commands with an event, trap multiple events or use conditional logic — you must resort to linguistic event handlers. ObjectView comes with a built-in Basic p-code compiler. (Noticeably absent from ObjectView Basic is a debugger, which will be included in Version 2.0.) You can also purchase a C version of the package, which supports Borland C and Microsoft C compilers.

Because of ObjectView's multilanguage support, the screen painter and the Basic compiler are not as tightly integrated as they could be. Developers must create the event handlers for a specific screen in an ASCII text file with the same name as the screen. This makes code management easier and allows one event handler to be associated with more than one control. However, this also means that the code is not stored code along with interface objects.

ObjectView is based on a powerful screen painter with tools for building complex user interfaces. You can select from a list of interface objects (also called 'controls') using either a toolbar or a menu.

ObjectView Basic extends beyond the standard features to provide functions for SQL database access, screen manipulation, DDE and file compression. There is also support for dBASE file, and index Btrieve access. While such support is a nice feature, the growing number of commercially available libraries providing access to these formats makes it less effectived than it once was.



After building a screen, ObjectView developers can associate 'actions' with each control through macros

ObjectView ships with many sample applications, which is good, since the documentation is often unclear. The sample applications would be even more useful if they were cross-referenced within the documentation to provide illustrations of the concepts discussed. In the previous release, online help was added to the screen painter, which helped mitigate the shortcomings of the documentation.

As a documentation of ObjectView's power, one of the sample applications, Visual Query, doubles as a utility. Visual Query provides capabilities for ad hoc querying and report writing, as well as database creation and maintenance.

Two additional utilities ship with ObjectView (neither are sample applications). The first is MiniAlbum, a tool to store, retrieve and manage images for use with the screen painter. The second, ObjectManager, lets you store and retrieve screen objects created in the screen painter along with their associated high-level commands. Because of the segmented nature of the development environment, you cannot store the code associated with these controls.

What's coming up?

ObjectView Version 2.0 should be shipping by the time this article is in print. Matesys plans to enhance the product's database awareness, improving its abilities to create joins and complex updates while minimising code size. Version 2.0 will also contain a data dictionary feature that will allow developers to store screen and code definitions on the SQL database server, which will allow for better group resource sharing and reusability. The Basic language will include an integrated debugger, and there will be much greater report-generation support. Finally, still more user-interface

AT A GLANCE

ObjectView Version 1.10

Distributor: dBSOFT
Telephone: (02) 746 2080
Price: $1599
Requires: 386SX-based PC or better, 2M of RAM (4M recommended), Microsoft Windows 3.x
In short: ObjectView entered the SQL front-end development market early in the game. It provides an unusually broad array of user-interface options and special features, but is sorely due for an update (expected to be released soon).

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features will be added, including support for customised controls written in C and a true spreadsheet control that includes calculation.

In its current incarnation, ObjectView is a powerful, fast and flexible SQL development tool that allows you to accomplish a great deal even though it requires very little training. It is especially well suited for writing applications that call for non-standard interfaces or functionality beyond data manipulation. Although ObjectView presently lacks the database awareness and group development features that can be found in competing products, these weaknesses will be corrected in Version 2.0.

Jonathan Zuck

PowerBuilder



PowerBuilder is a high-end, SQL-based, client-server development tool for Windows. Version 1.0b established PowerBuilder as a popular product. With Version 2.0, which adds and refines features such as dynamic SQL, report writing, MDI (multiple document interface) support, customised object creation, and object-oriented programming (OOP) support, PowerBuilder moves to the head of its class.

A modular approach

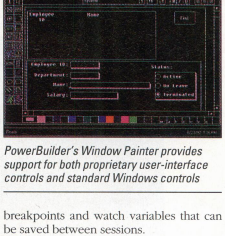
The PowerBuilder development environment is divided into screens called 'painters', each of which is responsible for the creation and maintenance of a particular aspect of the application. These screens include the Application Painter, the Database Painter and the Window Painter. Each of these components is stored in a private (client-based) or public (server-based) library. For group projects, PowerBuilder provides services such as library management and check-in/check-out of resources.

PowerBuilder's modular structure might frustrate programmers accustomed to more traditional, integrated environments. For example, the need to enter one painter to create forms may seem excessive. While PowerBuilder's approach is meant to provide a menu-driven replacement for the INCLUDE and .LIB files found in traditional programming, the newness of this approach makes the learning curve for PowerBuilder longer than it would be otherwise.

Most of your development time will be spent designing screens in the Window Painter. You can place any standard Windows control on the form, or one or more of PowerBuilder's proprietary DataWindow controls, and then associate code (in the form of event handlers) with each control. PowerBuilder directly supports nearly all the standard Windows events, including aggregate events such as drag-and-drop. Others can be accessed indirectly (although with a performance hit) using the generic message handler.

The PowerBuilder development environment is divided into screens called 'painters', each of which is responsible for the creation and maintenance of a particular aspect of the application.

The development language, PowerScript, is billed as a superset of Basic. While it is similar to standard Basic, there are a number of differences that make it less than a smooth transition. Some of these differences are unavoidable, but others seem almost arbitrary. It is unfortunate that PowerScript does not adhere more closely to the existing Basic language standards, but PowerScript offers over 500 additional functions, including embedded SQL. It also includes a powerful debugger that provides



PowerBuilder's Window Painter provides support for both proprietary user-interface controls and standard Windows controls

breakpoints and watch variables that can be saved between sessions.

When you have completed your application, PowerBuilder generates a p-code executable for distribution that can be loaded on the server or client machines along with the PowerBuilder libraries. The product supports the dynamic PowerBuilder libraries, similar to Windows DLLs, for execution-time access.

High database awareness

Designed from the ground up as a dedicated SQL front end, PowerBuilder is 'database aware', with many SQL-specific features not found elsewhere. One example is the DataWindow, which offers tabular, grid and free-form views of data, and is capable of most data access functions with little or no programming or knowledge of SQL.

One shortcoming of Version 1.0b was the excessive data-type protection in DataWindow. If the DataWindow had been developed for a database that had one data type for date and time, it would not work when transferred to a database that used separate data types to record these variables. This meant that DataWindows could not be created dynamically, nor could they make use of dynamic SQL from within the PowerScript language. Both of these limitations have been eliminated in Version 2.0, making PowerBuilder more flexible than before.

PowerBuilder maintains a local dictionary of information associated with each table in the database. Using the Database Painter, you can define database-specific attributes such as default labels, default values and validations at the table level rather than the form level. These attributes, which can be overridden if necessary, are a convenience.

OOP without the ouch!

One of the most exciting new features of PowerBuilder 2.0 is its object-oriented ex-

AT A GLANCE

PowerBuilder Version 2.0

Distributor: PowerSoft Australia
Telephone: (03) 866 6014
Price: From $4200 to $9000, depending on database
Requires: 386-based PC or better, 2M of RAM (4M recommended), 8.5M of hard disk space, Microsoft Windows 3.x
In short: PowerBuilder, a high-end visual development package, features object-oriented extensions and dynamic SQL. The modular structure may challenge more traditional programmers.

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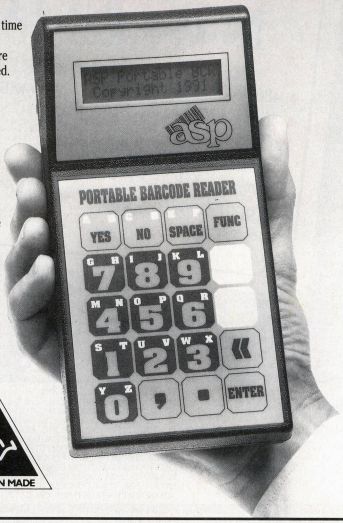
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tensions. Since components of each application are stored in the libraries at a fairly granular level, it was only natural that PowerBuilder would eventually offer encapsulation and inheritance options. PowerBuilder's OOP capabilities are not linguistic in nature, but rather are driven by the interface. That means a shallower learning curve for users.

In OOP, inheritance is the ability to create one object and then create others which are based on the first. With PowerBuilder, a developer can either start from scratch in the Window Painter or inherit the attributes of a prebuilt window. When a window inherits the attributes of another, all of the visual objects and associated code become part of the new window. The programmer can then add to or overwrite any of these components. This functionality can be used for something as simple as maintaining a consistent visual interface, or as complex as managing group-development efforts.

Another new OOP feature is the ability to build and incorporate customised controls. PowerBuilder allows for three types of custom controls: standard, aggregate and external. The standard control is a Windows control associated with a customised set of actions and stored for reuse. For example, a list box might be used to build a customised file-list control with attributes for the path and events for path change and file selection. The aggregate control is a combination of standard controls that are stored and re-used as a unit. Examples of this type of control would be a palette of buttons that perform standard data access operations, or a palette from which to select a colour. Aggregate controls may themselves be pyramided into other aggregate controls, or aggregate and standard controls may be mixed. An external control is a customised control written in a standard language and stored in a DLL. Developers can define the attributes and events of these customised controls so they behave like native, transparent PowerBuilder controls.

PowerBuilder is a powerful tool for SQL front-end development that deserves serious consideration by developers of Windows client-server applications.

A good report

One limitation of Version 1.0b was its weak report-writing functionality. It lacked the ability to print subreports — with separate headers, footers and totals — in one run. This has been remedied through enhancements to the DataWindow object. You can now define, by group, the headers, footers and totals to be displayed and the data window to be printed. The printing commands are now more sophisticated, too, though PowerBuilder could certainly go further in this regard by providing a separate painter for building complex reports with less effort.

PowerBuilder is a powerful tool for SQL front-end development that deserves serious consideration by developers of Windows client-server applications. With its visual development environment, sophisticated controls, rich Basic dialect, multilanguage support and OOP features, PowerBuilder represents the state of the art in front-end tools.

Jonathan Zuck

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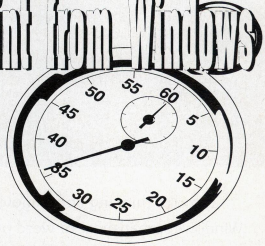
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Peter Keen: on the three Rs (rethinking, renaissance and revolution), how our local timber industry is proof that we're not `cutting it' in our management strategies, and the good sense of using location independence offered by information technology.

INTERVIEW WITH

Peter Keen

BY HELEN DANCER



Peter Keen is the executive director and founder of the International Center for Information Technology on the island of St John in the US Virgin Islands. Together with his background in teaching (at Harvard, MIT and Stamford), the Center has had considerable influence over the business community. Using a high degree of location independence in choosing the site for the centre typifies one of the key concepts Keen exhorts his client base to adopt: taking advantage of the current state of information technology capability.

Keen spends his life either on a plane or telecommuting, and when he's not speaking, he is writing, not about now, but about what comes next . . .

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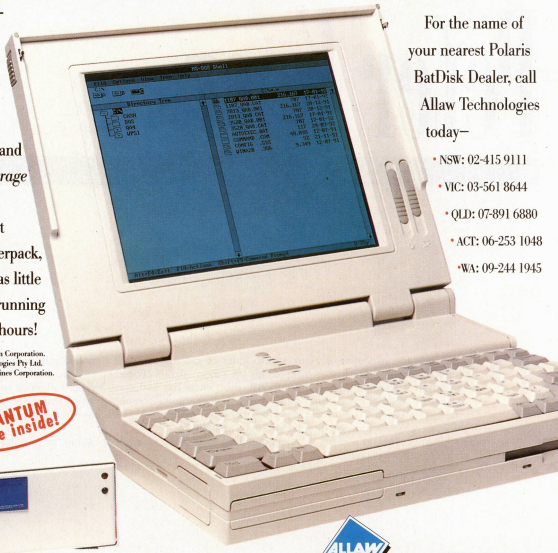
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"The Center was established in 1986 to relay information to senior executives, through research, publication and education. The point is that there are now plenty of pieces, and integration has become a business issue, not just something that management should be happy to turn over to their MIS people.

This means that platforms, rather than applications, are the key. The problems with the state of technology are these: that change is seen as radical, that the payoffs are unproven, and that the greatest perception is, 'the more you spend, the less you get'.

Margins are declining, so business has to look elsewhere in order to create and manage its profit. There's a growing need to look to the point of event to properly manage this. The point of event is what will help business decide how to streamline and manage the profit. The point of event is probably singular to each business and reflects the hub of the relationship it has with its customer base. Look to the point of sale and point of order, and manage inventory from the buyer's end of the spectrum, not from the point of view of what's in the warehouse.

What's in storage is not an issue; business is about what's being bought.

There's also a need to cut down in three key areas: the labour force, real estate and technology. Proper application rather than large investment in each of these areas will lead to better management of the diminishing profit line.

The technologies that business must employ are those which will engender a capability that is greater than the cost of its installation.

Take, for instance, a technology such as Notes — which is a framework for better business, rather than a specific application. This is the technology management scale on which businesses should be thinking, rather than focusing only on single product strategies and single problem solutions. And in choosing new technology, you need to ask yourself if employing such tools is the way to introduce new capability without adding to cost. In other words, will the new framework contribute to the business and outweigh its initial investment.

Take the airline industry as an example of the new technology-enabled strategy (adding new capability without adding to cost). With the systems it has already established to make airline reservations, it doesn't cost the airline industry any more to include hotel reservations on its list of services. The shift, therefore, is towards the need to more clearly justify in business terms rather than technological-capability terms (investments in higher forms of computing power).

The Center focuses on next year's issues, and our efforts are based on staying ahead of the change curve. There's no point in telling our client base what's happening now because the companies we consult use the services we offer to plan and keep ahead.



"Today, technology offers not only the portable computing environment, with all the features its name suggests, but also telecommuting and multimedia. Multimedia offers tremendous potential, but business at large is at a loss to know what to do with it."

At what point we find ourselves in the curve right now is reflected in three areas. First, margins are lower, and serious rethinking is required to maintain profitability. Second (and something that I think Australia has for the most part failed to grasp), globalisation has already occurred. There's such a large goods and services pool now, and optimising the opportunity of dealing in that larger pool (both in terms of servicing and taking from it) is essential in maintaining focus and thus building profitability. Geographical isolation is no longer a valid reason, nor even an excuse for non-participation.

Third, there's a change in organisational structure, but it's a very uncertain one. Structural change is happening, but at the executive level, it's too often a case of looking around and saying, 'Is this it?' and 'Is this right?'. Business recognises that the change in organisation is important, but the nature and direction of change is causing problems for some companies.

This means, however, that business and technology are moving together, towards executive-led IT strategies. Instead of the conventional mode of thinking, where companies had a business plan, then asked the MIS department to develop an IT strategy and hoped that the two would converge, the two have become one at the root structure rather than branches on the same tree.

It's an important development because expenditure on information technology may represent as much as 50 per cent of a company's capital investments, which is a serious proposition when planning how to maintain the profitability as well as the long term goals of the company.

It's also one that is dictated by the labour demographics we're currently seeing. Fundamentally, we have reached the stage where we have run out of literate 18-year-old people. In the US service industry, for example, there are three jobs for every two people. We are also desperately short of degree-qualified people: over 50 per cent of our graduate employees come from overseas. Choosing a technology strategy that measures up to all these demands is definitely a management rather than purely a MIS issue.

So, that's my perspective on where we are now. As for the next stage in the change curve, it's easier to meet that with questions than with answers.

While the '80s looked like a time of revolution, with the rise of the PC and the growth of the portability/power spiral, it was, in fact, a gradual development with a linear progression (especially when you look at it from the perspective of change today). The current rate of change is radical, both in speed and the variety of directions. Today, technology offers not only the portable computing environment, with all the features its name suggests, but also telecommuting and multimedia. Multimedia offers tremendous potential, but business at large is at a loss to know what to do with it. Technology has sped up well beyond our capacity to apply it, and our ability to use it to find solutions to business problems is constrained by the limitations of what we know.

In reality, if you want to develop a better banking system, you're probably better off employing someone with a background in Nintendo games, or even someone who has worked in a video studio.

In the past, development has been hampered by technical limitations, such as being constrained by the lack of bandwidth. But now, with the availability of 2.4 billion bits per second on fibre optic cable, the problem is not how to get access to the power, but what to do with it. We have at our fingertips the ability to reinvent the machines we need — that is, to create message machines like cash registers.

PETER KEEN

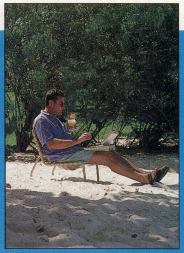
We've never known 'how' because we've never had the opportunity, and historically, we have developed new technologies by extrapolating from the status quo.

This way of developing new technologies has come to mean that what has evolved is a series of variations on a theme, and in the process, we've lost the art of looking at things in radically different ways.

To achieve new and spontaneous ways of developing ideas, we actually need people who are ignorant of the way it has always been done to come up with a better way. So I'm serious about it being essential (to a degree) when I say that if you want a new banking system, then go to a Nintendo expert. Look for someone who, instead of knowing about funds transfer or being able to programme in 10 different languages, has a knowledge of how children use their fingers and the mindset of the popular culture.

If technology is not taking business forward, which is the common cry from the corporate world, it's not the technology's fault; instead, it's a management problem and an inability to look at things from anything other than the perspective in which they've been historically viewed.

As for what comes further down the track, I'm tempted to think that technology will be even more advanced than we dare dream of. As we've seen, technology is already advancing at a rate beyond our ability to use it to its fullest extent. Thus, the future of technology is the future of management ability. Quite simply, innovation itself is not enough. What technology now needs to deliver is a process and language that management can understand and work with. On the other hand, there's a need for fresh-thinking management, as well. And it doesn't involve re-working or re-engineering, or any other 're' word because they simply mean 'try again because it didn't work the first time'. The only three 're' words we should hold on to are rethinking, renaissance and revolution. All the others will keep us going around in a devolutionary spiral, precisely the point at which we now find ourselves. These 're' words connote a failure the first time round, and continue to hold our focus on where we have been. Renaissance and revolution imply some degree of ignorance of or a purposive disregard for the way things have been done and, as such, hold the

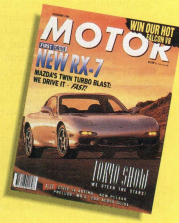


"If technology is not taking business forward, . . . it's a management problem and an inability to look at things from anything other than the perspective in which they've been historically viewed."

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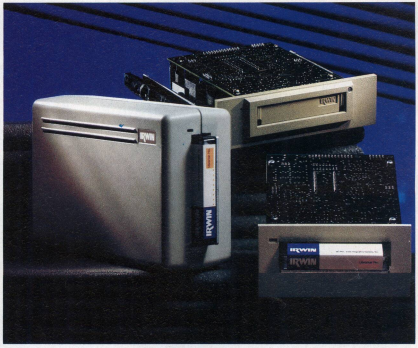


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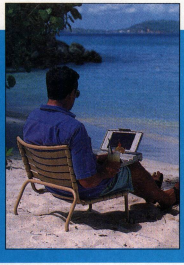
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"Location independence is a key concept — the stubborn adherence to geographical restrictions typifies the mindset of a population which has the capability . . . but doesn't know how to apply it."



promise of new ideas rather than extrapolations from what we already know.

Location independence is a key concept — the stubborn adherence to geographical restrictions typifies the mindset of a population which has the capability at its fingertips but doesn't know how to apply it.

For Australia, the concept is essential because the spaces are so vast. Farmers, for example, need to have access to phonebank because they are so geographically isolated. The same applies to the distances between population centres. There should be no reason why you can't do business with a company in, say, Melbourne, just because you are located in Sydney.

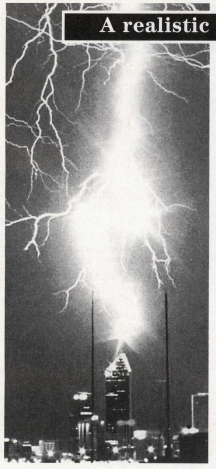
Telecommuting is a key tool of location independence. There is no technological impediment in working from wherever you please and using the technology at your disposal to 'be' somewhere else in an instant.

Do I think Australia is poised to take full advantage of location independence? Frankly, no. There doesn't seem to be the right mental approach. I say this because of the way we have seen Australia give ground to Singapore, in an effort to gain key positioning in an international trade role in the Asia Pacific.

Of all the countries in the region, Australia was strategically positioned, but it failed to take advantage, both organisationally and technologically, of the opportunity.

I believe that the historical abundance and a mindset which revolves around primary and secondary industry is holding the country back from taking better advantage of its talent and position. There seems to be no natural momentum, and unfortunately, the only thing that will revive the spirit of competitiveness is a decline in the standard of living. It's a lazy economy, although there are some very fine players in it. But think about this: for a country which is historically used to cutting down trees and milling them, the prospect of importing timbers from its near Asian neighbours is not something of which to be proud.

The pieces of technology are there; what remains is to make sense of the jigsaw and optimise the use of those pieces. The key is effective management — a new management structure in which information technology has real value, a language which conveys meaning, and a serious enterprise-wide, long-term organisational structure.



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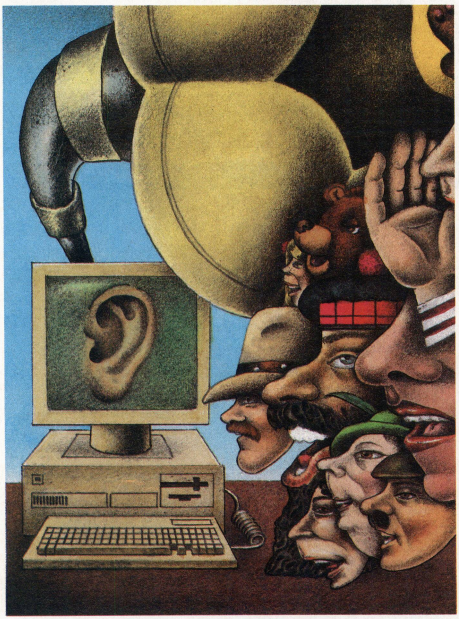
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Wiring hubs: the low-cost alternative

Now you're talking

BY DAVID GREENFIELD



New technology from Novell offers wiring-hub functions at a fraction of the cost. Here's what you can expect from these low-cost NetWare-based solutions.

Forget the cheque book — break out the piggy bank instead. You're about to embark on a wiring scheme that's going to cost hundreds, not thousands, of dollars. Impossible, you say? Not with hub cards.

Thanks to a management specification from Novell, you can now wire small to medium-sized networks with a hub based on simple network management protocol (SNMP) cheaply. Instead of $200 or $300 for each managed port, you'll only need to spend around half of that.

The specification, called the hub management architecture (HMA), enables hubs the size of an EISA or ISA adaptor card (hence the name hub card) to slide into a client PC or file server. Though hub cards have been available for some time, they've required the hub vendor to create network-management software.

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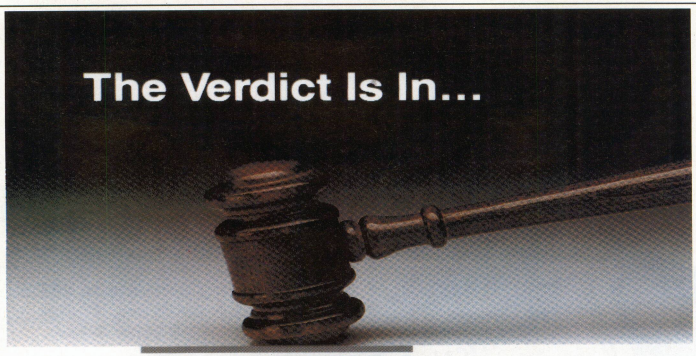
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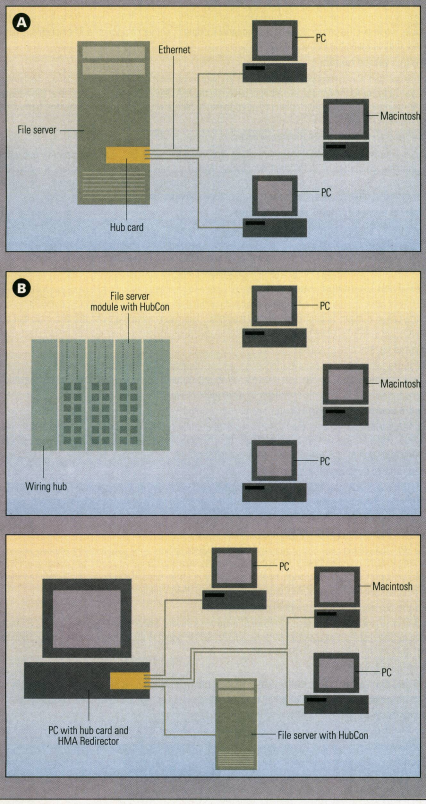
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THE DIFFERENT FLAVOURS OF HMA

There are three basic ways to implement hub management architecture (MHA). The least expensive, hub cards, typically places the hub in the file server (A). Some vendors, such as NetWorth, create a file-server module that slides into the wiring hub and runs HubCon, a management application (B). A third approach, the HMA redirector, is currently offered by Intel (C). It places a hub card in a PC and redirects HMA calls across the network to the file server running HubCon.



With HMA, vendors can now rely on Novell to supply network management through a NetWare Loadable Module (NLM) called HubCon. Many of the leading hub vendors, including Cabletron Systems, Chipcom, SynOptics Communications and Ungermann-Bass, have announced support for HMA.

The HMA architecture

HMA focuses on an interface that Novell calls the hub management interface (HMI). HMI contains five extensions to Novell's driver standard — the Open Data-link Interface (ODI) — that allow vendors to write drivers that gather management information from the hub cards. The drivers pass this information up through HMI to HubCon or an SNMP management agent in the file server.

HMA allows you to combine low-level statistics with higher level network operating system information to troubleshoot networking problems

To date, two vendors have shipped or announced hub cards for HMA. Intel's EtherExpress TPE Hub is priced at $1525 for ISA and $1730 for EISA machines. Both models provide a LAN adaptor with 12 10BaseT ports. Intel's $1325 EtherExpress Expansion Hub is an ISA-bus device that you can use to add another 12 ports, or use as the managed hub in a PC with an existing network adaptor.

Eagle Technology announced its hub-card around press time. The NE32HUB-Base contains 12 RJ-45 ports on a 32-bit 10BaseT adaptor. If you already have a network adaptor installed or need more than 12 ports, Eagle also offers the NE32HUB-TPE, a 12-port hub without the 10BaseT connection. Thinnet support is also available.

Windfalls and pitfalls

HMA allows you to combine low-level statistics with higher level network operating system information to troubleshoot networking problems. HubCon, for example, provides you with information that's more specific than merely the address of a networked PC — you can identify the user connected to a particular port.

Although hub cards seem like the perfect answer to network management woes, be careful about placing the hub card in the file server, especially one that has been operating well for months. Unlike wiring hubs, PCs don't allow you to plug and unplug modules without turning off the hub: you'll need to bring the server down to replace the hub.

Software may also present a problem. Running more NLMs (NetWare Loadable Modules) in the file server requires more memory and processing power. Many network managers are simply reluctant to add another application, in this case HubCon, to the file server.

What's more, while HubCon can monitor and report on Ethernet hubcards, a standard

Although hub cards seem like the perfect answer to network management woes, be careful about placing the hub card in the file server, especially one that has been operating well for months

interface is still not available for Token Ring hub cards. Some vendors, such as Chipcom, have extended HMA, but the Token Ring management application they've created will only function with hub cards supporting these vendors' own HMA extensions.

Finally, file servers and wiring hubs are not typically located in the same room. The wiring hub is designed to be located in a wiring closet — not the ideal place for a file server, and an even worse place if you have printers physically attached to the file server.

Hub cards hold great promise for small networks, where wire can be laid along the baseboard behind users' desks, and also in very large organisations, where a manager can plan and install server rooms with terminations for the wiring, adequate environmental control, and backup power for the servers.

Other implementations

Vendors have tried a few other alternatives to standalone hubs. Some vendors, such as NetWorth, have placed a server in the wiring hub. In this setup, an optional module inside the hub runs Novell's NetWare Runtime Version 3.11. The machine can then run NLMs such as HubCon, but cannot offer file or print services. Placing the file server inside the

A hub glossary

Asynchronous transfer mode (ATM)

A specification for transferring any type of data at up to 155Mbps. ATM is viewed by many as the next-generation network specification that will provide a single connectivity solution for local and wide-area networks.

Backplane versus bus

These two terms are often used interchangeably in the hub industry. When we refer to the bus in this article, we mean the group of traces that connect modules or other components. The backplane is the board that contains the bus.

Bridges versus routers

These are two ways of connecting networks. Bridges function at the MAC layer, making a decision to forward a frame to the connected network based on the MAC address. Routers function at the network layer, using addressing information provided there to decide whether or not to move the frame onto the adjoining network.

Concentrators versus MAUs versus hubs

Concentrators are typically Ethernet devices that connect client PCs, servers, printers and other networking equipment. A multistation access unit (MAU) is a similar device that is aimed at Token Ring networks. It can be a standalone product or be sold as a module that slides into a chassis. The chassis (any installed modules) and the management station comprise the hub.

Ethernet versus 10BaseT versus 10BaseF

Ethernet is a method of arbitrating access to a cable. Basically, attached devices listen to the cable. If it's free, they transmit data; if it's not, they wait. If two devices transmit simultaneously, they wait before retransmitting. 10BaseF is the spec for running Ethernet over fibre-optic cabling. 10BaseT is the spec for running Ethernet over unshielded twisted-pair cabling.

FDDI (Fiber Distributed Data Interface)

FDDI is another method for arbitrating access to a cable. It operates at 100Mbps and uses a special frame called a token to control access to the cable. The token travels around the network, and any station that wants to transmit data grabs the token. All other devices on the network examine the data.

In-band versus out-of-band

These are two ways of communicating management information. With in-band management, information is communicated across the network. With out-of-band management, data is communicated through another link, typically a modem or some other serial connection.

Media access control (MAC)

The MAC layer is that part of the ISO (International Standards Organisation) model that describes how devices share access to the network. Token Ring, Ethernet and FDDI are MAC-layer specifications. Wiring hubs primarily deal with MAC-layer equipment.

Management information base (MIB)

MIB is the spec for how data is stored in an SNMP device. Vendors have their own MIB extensions to customise SNMP for their devices. Be sure that your hub's management station can easily extract information from other vendors' MIBs.

Remote Monitoring MIB (RMON)

The MIB that enables any SNMP management console to extract information from a protocol analyser running RMON. If you're looking for a protocol analyser in a hub, there's a good chance that you'll want RMON support. Be careful, though. RMON consists of nine sections, but vendors don't need to support all nine to claim RMON compliance. Look for complete RMON support.

Simple Network Management Protocol (SNMP)

SNMP is a language for exchanging information about a device. SNMP management stations are those devices that display management information. An SNMP agent is the software in the various devices that gathers the management information.

Terminal server

A device that connects terminals to a network that is typically running Ethernet. Most of the wiring hubs reviewed in this feature offer terminal servers.

Token Ring

An access method that operates conceptually the same way as FDDI, but at a lower speed (either 4 or 16Mbps).

Traces

These are copper runs, or wires, found on integrated circuit boards and used within buses for connecting two points.

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wiring hub gives you the benefit of the wiring hub's rugged architecure. If a module should fail, you can dispose of it and insert a new one. You still have to pay for the wiring hub, however.

Another alternative is the Remote Hub Agent from Intel. This option redirects HMI calls across the network to the server running HubCon or Novell's SNMP agent. You place the EtherExpress TPE Hub in any DOS-based PC and manage it using HubCon.

Shopping for hub cards

Know your configuration and your growth plans before you make a purchase. If you plan to use an HMA-compliant hub-card in your file server, make sure you have enough expansion slots available and that you can place the hub at the centre of the wiring installation. If you only have eight slots, you'll need an expansion chassis or another server to support the more than 100 LAN nodes.

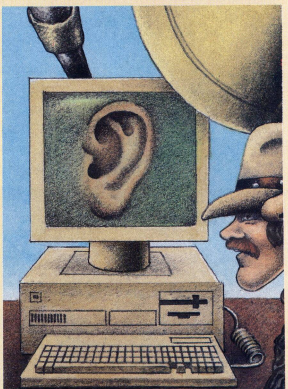
To operate effectively in a server, hub cards need fairly high throughput while minimally impacting server-based applications. Typically, a 16 or 32-bit adaptor that implements bus mastering is a good choice.

Most HMA-compliant hub cards are based on a server/slave configuration. The first card you install in your server works as a wiring hub and a network interface card. Each additional hub card is daisy-chained to the original card via a short ribbon cable and only acts as a hub, not a network adaptor. If you already have a network interface card, you normally do not need to purchase the card that provides the network interface.

To operate effectively in a server, hub cards need fairly high throughput while minimally impacting server-based applications. Typically, a 16 or 32-bit adaptor that implements bus mastering is a good choice.

The HMA specification enables vendors to produce manageable wiring hubs less expensively. If you're looking to connect a small group of PCs, hub cards can be a great solution. For larger networks, be prepared to spend more money on dedicating a machine to the hub card or using one of the other hub alternatives.

Roll your own hub



What's it like to build your own wiring hub? To answer this question, we set out to create a 24-port wiring hub. We used a Compaq 386/25e with a 12-port Intel EtherExpress Hub Adapter and the EtherExpress Expansion Hub for 12 more ports. For management, we relied on HubCon, Novell's management utility that runs on the file server.

We found that ease of installation is perhaps more crucial with hub cards than with other products. If you're going to rely on the vendor's network connection, then you'll need to buy a hub card that will have minimal impact on the file server, so be sure to look for low CPU utilisation.

Although we did not evaluate the CPU utilisation of the EtherExpress, we looked at its installation. You'll want a hub card that's software- configurable — exactly what the EtherExpress offers through its HubSetup utility.

HubSetup's method for resolving conflicts is a time-consuming annoyance. Rather than finding a free interrupt or memory address, HubSetup responds to a conflict with another option board by requiring you to remove the other card, reconfigure the hub card and then reinstall the other option card.

You also need to follow some general rules when installing hub cards in the PC. First, you can have only one network adaptor in each cluster, or a group of eight hub cards. The rest of the hub cards must be expansion boards. If you need multiple clusters, your only limitation is the number of computer slots you have at your disposal.

If you require a connection from the cluster to an external source, then you must install the AUI Port accessory. This connects to only one hub board and requires one slot for the connector. If you are already running low on slots inside your computer, sacrificing this slot may be a particularly painful step — a situation that Intel needs to address.

Because the wiring hub is independent of the network protocol, you would think that the hub card would also be independent of the network protocol. Not so. Because the hub card also connects to the server, you need to load a driver as well. Though the manuals do not specifically discuss using multiple protocols with these cards, I was able to load IPX (Internet Packet Exchange) and AppleTalk protocols, and successfully log onto the file server from a PC as well as a Macintosh client. If you've installed IPX or AppleTalk before, you should be able to configure the drivers without any problems.

You will need HubCon to manage the wiring hub. If you're familiar with other Novell utilities, HubCon will be a cinch for you. It offers the standard C-Worthy interface and tracks all the essential statistics: status and statistical information viewed by port and by board, board-level and port-level control, and notification if the board or port is deactiviated or not functioning within the 10BaseT specification.

The manuals for the Intel EtherExpress TPE Hub provide detailed instructions on how to configure and install the products. They also come with an ample number of diagrams that provide further clarification. Both of the manuals offer a table of contents, a glossary, troubleshooting sections (not only for the product, but also for the network in general), error messages and an index.

Perhaps the only things that need to be added would be more information about the various configurations available for running different protocols on the cards, more information concerning what can be put into the AUTOEXEC.NCF and file server startup file, and more instructions on installing multiple EtherExpress boards in the same computer. Free service is provided via fax, BBS, CompuServe and MCI Mail. A flat fee for phone support (after first-time installation) is also provided.

By Jeffrey Carrell

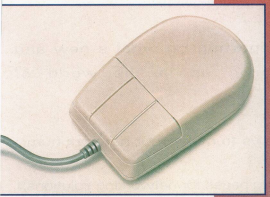
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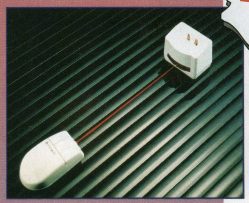
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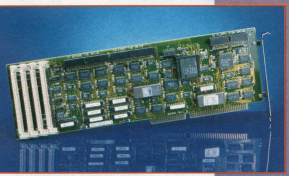


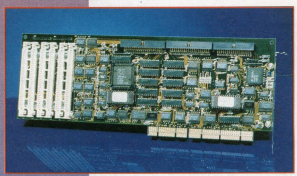
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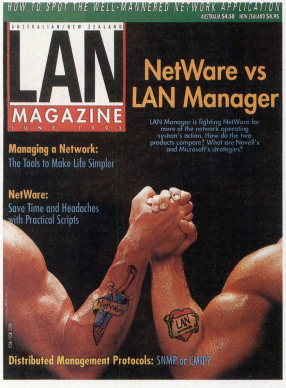
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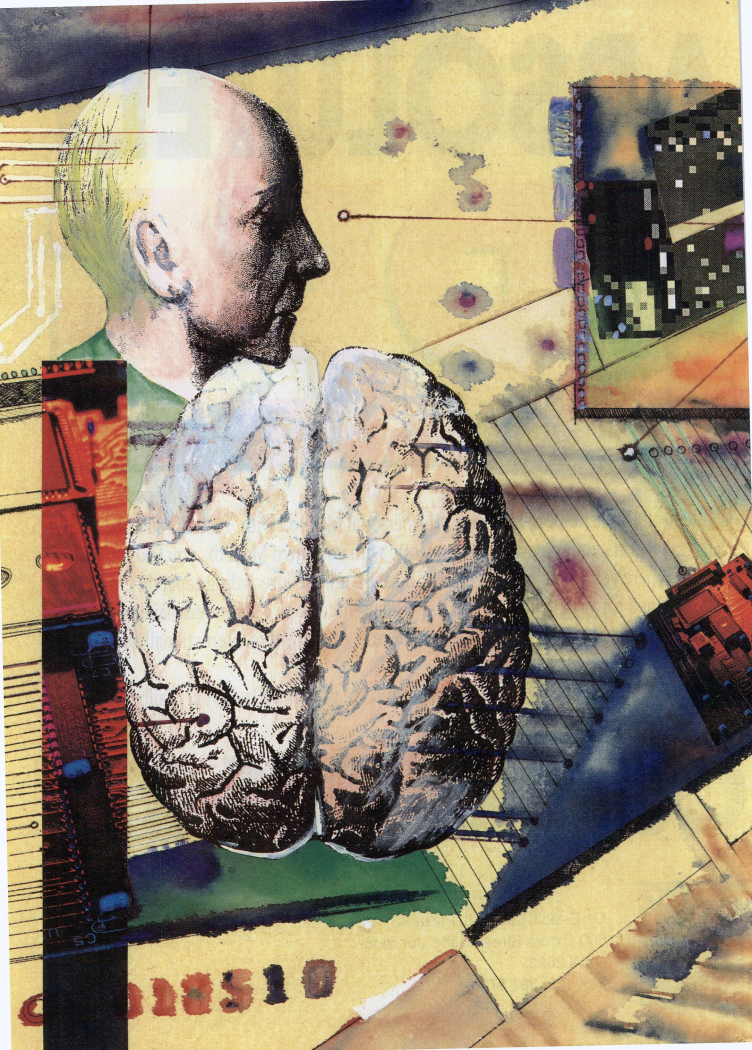
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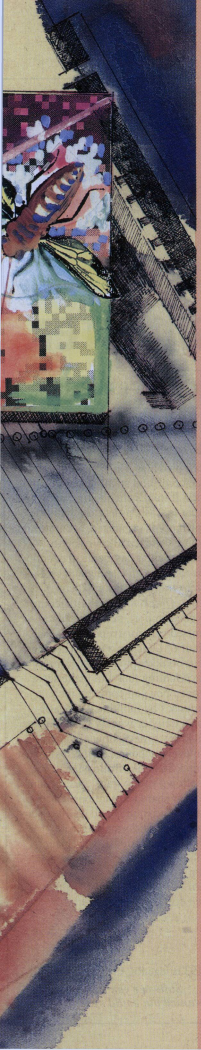
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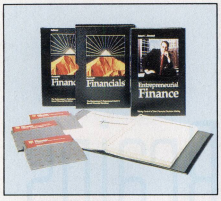
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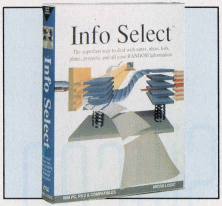
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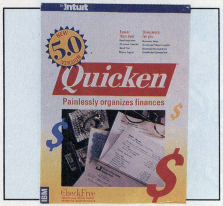
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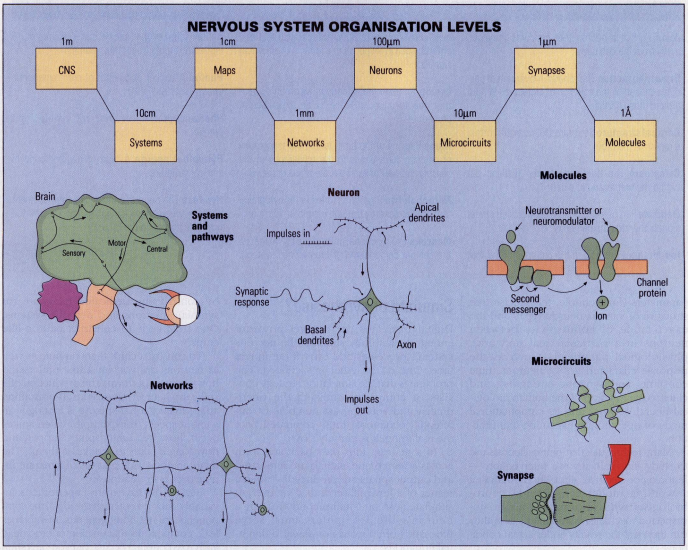
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In addition to the sheer intellectual value of understanding ourselves, understanding how brains work could produce important economic benefits. If you know evolution's computational tricks and architectural ingenuities regarding speed, power and flexibility, you can apply them to a variety of areas: image processing, speech recognition, free-form handwriting recognition and holographic applications.

Current-generation neural networks capture some of the brain's general features, such as the parallel architecture. But neural networks represent only the beginning of brain-style computer technology.

Computing in parallel

While digital technology is still very much in its heyday, there is tremendous potential in analogue VLSI for addressing real-world problems. For example, current algorithms running on a digital machine can correctly read written numerals on credit-card sales forms around 60 per cent of the time. The problem of machine- reading postal codes on letters is compounded by the problem of locating the digit, which is unsolved.

The crux of the difficulty is that digital machines are typically programmed to solve the segmentation problem (for example, what character does a squiggle belong to?) and after that, to solve the recognition problem (for instance, is it a 0 or a 6?). Should the machine missolve or fail to solve the segmentation problem, recognition is doomed.

Brains, it appears, do not serialise the segmentation and recognition problems in lockstep fashion. As often as not, recognitional cues are used to solve the segmentation problem.

In general, people believe that the brain's approach more closely resembles co-operative computation or constraint satisfaction than theorem proving. Of course, it takes a lot more computing to be able to solve the segmentation and recognition problems in parallel. With analogue VLSI technology, people are learning how to build machines that really compute in parallel.

Reverse engineering the brain

Computational neuroscience is the study of how the brain represents the world and how it computes. Being able to model the brain's neural circuits by computer is essential in finding out how neurons (the cellular components of nervous systems) interact with each other to produce complex effects (see the above figure). Such effects include segregating a figure from its background, recognising a banana from different angles and following items moving in 3-D space.

Neuroscience contributes three main ingredients to this effort: anatomical

Glossary

Axon Part of a neuron that conducts impulses away from the cell body.

Brownian motion The random movement of particles caused by the collision of molecules in fluid around those particles.

Cortical structure Structures found in the cortex, a region of the brain.

Cytoplasm The fluid outside the nucleus but within the membrane of a cell.

Dendrite Part of a neuron that conducts electrical signals towards the cell body.

Ion channel Proteins in the cell membrane that may reconfigure to let specific ions (such as, Ca^{2+}) enter the cell in response to chemical or electrical signals.

Lesion An abnormal change in an organ's structure due to injury, disease or an experimental procedure.

Maps Regions of the brain where the topography of neurons corresponds to the topography of the sensory surface (for example, the retina or the skin).

Mitochondria Structures found in the cytoplasm that produce energy through cellular respiration.

Neurons The functional units of the brain (that is, the cellular components of the nervous system).

An individual neuron can be either excited or inhibited by inputs from other neurons.

Photon A packet or quanta, of electromagnetic energy (such as light).

Photoreceptor A receptor for visible light stimuli.

Pyramidal neuron A type of neuron found in cortical structures.

Synapse The point of contact between adjacent neurons where nerve impulses are transmitted from one neuron to the other.

parameters (for example, the precise tree structure of various neuron types and the exact mode of connectivity between neurons in a particular real network), physiological parameters (such as the response characteristics of neurons, time constants and synaptic strengths), and clues to the function of the human biological neural network and its computational mode of operation in executing that function.

Many techniques that neuroscientists use to study the brain involve intervention — lesioning or electrical stimulation. Analysing a working model can provide neurobiologists with information about unsuspected mechanisms and interaction; they can then test the results under actual conditions.

This type of collaboration between computer modelling and neuroscience is already producing ideas for new and innovative computing procedures. It has resulted in architectural designs for interacting in real time, storing associative memory more efficiently, co-ordinating mixed modality, multiplexing and understanding attention selectively.

Simulate or synthesise?

Digital machines are not yet powerful enough to faithfully simulate the nervous system's processes and carry it out in real time. One or the other is sacrificed. The problem is that the simulation strategy consists of compartmentalising the phenomena and solving vast numbers of differential equations; thus, compared with the real thing, it is pitifully slow.

In a neuron, ions pass back and forth across a membrane, signals are integrated and output spikes are produced — all in a matter of a few milliseconds. However, to simulate just one millisecond (ms) in a neuron's life, computers must solve thousands of coupled non-linear differential equations.

To compound the problem, these equations use a wide variety of time scales. In the simulation, the time steps can only be as long as the shortest significant interval. Consequently, even a powerful workstation will take minutes to simulate 1ms of real time of the electrical and chemical events occurring in a single neuron. You can circumvent this problem by constructing dedicated hardware for synthetic neurons and nervous systems. One strategy is to construct neuron-like chips.

To construct chips that compute as well as neurons do, you must first understand how neurons perform. The production of a spike in a neuron's axon is an all-or-nothing affair. Even axonal spiking is analogue in some respects (for example, when spikes occur, how frequently spikes happen and how long it takes to repolarise them). The main analogue integration of synaptic inputs occurs in dendrites.

Real circuits have many imperfections. Invariably, they do not meet the ideal, the components are not homogeneous, membranes leak, components malfunction or drop dead and cross coupling occurs. But you can't shun chip construction entirely in favour of performing simulations. The best long-term direction people should take veers towards finding out how real circuits obtain precisions, speed and power from imperfect and imprecise components. Somehow, neurons operate in real time and cope magnificently, probably by exploiting imperfections to their advantage. The coping capacity

Analogue VLSI versus digital VLSI

Analogue VLSI is strikingly superior to digital technology in terms of cost, power and computation density. (Estimates by Federico Faggin)

	Cost (MCS*/$)		Power (MCS/watt)		Computation density (MCS/ft^2)	
	1991	2000	1991	2000	1991	2000
Conventional digital	0.002	0.1	0.1	10	0.2	10
Special-purpose digital	0.1	4	10	10000	10	1000
Dedicated digital	5	200,	500	50000	40	3000
Dedicated analogue	500	20,000	50,000	5000,000	4000	4000,000
Human brain		10^{9**}		10^{10}		10^{11}

MCS = A million connection updates per second
** This calculation assumes that the cost of a human brain is $1 000 000

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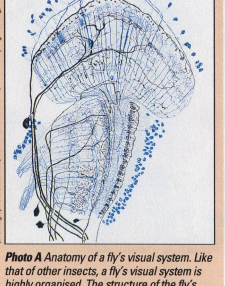
Start by contrasting what a small honeybee can do with tasks that today's most powerful computers can't do, and add to that the fact that a honeybee's brain only has about one million neurons versus the human brain's 100 billion neurons. Then consider the following information:

Energy efficiency A honeybee's brain dissipates less than 10 microwatts (10^{-5}). It is superior by about seven orders of magnitude to the most efficient of today's manufactured computers.

Speed A honeybee's brain, roughly and conservatively, performs at about 10 TFLOPS (10,000 GFLOPS). The most powerful of today's computers approach speeds of only 10 GFLOPS (1 billion operations per second).

Behavioural abilities Honeybees harvest nectar from flowers and bring it back to the hive. They maximise foraging benefits and minimise foraging costs — for example, by recognising high nectar sites and remembering which flowers they have already visited. Honeybees can see, smell, fly, walk and maintain balance. They can navigate long distances and predict changes in nectar location. They communicate the location of nectar sources to worker bees in the hive; they recognise intruders and attack; they remove garbage and dead bees from the hive; and, when the hive becomes crowded, a subpopulation will swarm in search of a new home.

Autonomy and self-reliance Honeybees manage these activities entirely on their own without any help from superior beings. By contrast, a supercomputer needs the constant tender care of a cadre of maintainers and programmers.



[Drawing by N. J. Strausfeld; Atlas of an Insect Brain, New York, Springer-Verlag, 1976]

***Photo A** Anatomy of a fly's visual system. Like that of other insects, a fly's visual system is highly organised. The structure of the fly's system shows how the neurons (black) are organised into layers of visual processing*

Size A honeybee's brain takes up only around a few cubic millimetres of space. It is a marvel of miniaturisation. You cannot reach all the way around a supercomputer.

From this comparison, it seems we have some way to go in allowing computers to perform a few of the simpler things in life. Nature and its creatures are models for ways in which to improve our computing devices. (See photo A for an inside view of the insect visual system.)

of real-world neurons is itself computationally interesting.

Neurons are organic. They use fatty molecules to make resistive membranes. Complex proteins make ion channels that allow current to flow across the membrane, and cytoplasm acts as the medium for transmitting current. Mitochondria are the neuron's miniature powerpacks, and circulating oxygen is their energy source. But what can you use to construct synthetic neurons?

Synthetic neurons

Analogue VLSI technology turns out to be well suited to constructing synthetic neurons for two reasons. One is theoretical, and the other is practical.

The device physics of doped silicon operating in subthreshold regions is comparable with the biophysics of ion channels in the neuron membrane. Therefore, you can implement the differential equations directly with analogue circuits in CMOS VLSI. And the same techniques used to create digital VLSI chips can be adapted to make analogue VLSI chips. Carver Mead of Caltech and Synaptics, and Federico Faggin of Synaptics, both industry pioneers who played leading roles in digital chip technology, are now spearheading the development of analogue chip technology for neural systems.

With analogue VLSI, a chip can follow the brain's lead — for example, concurrently solving segmentation and recognition problems. As reported this year in *Nature*, a US publication Misha Mahwold and Rodney Douglas, both of Oxford and Caltech, achieved the first step in building silicon neurons (see the text box 'Silicon neurons' on page 139).

Using analogue VLSI, Mahwold and Douglas created a chip that mimics selected properties of pyramidal neurons, a type of neuron found in cortical structures. Their silicon neuron only consists of one compartment (the cell body) and four types of ion channels in the membrane. By contrast, a real pyramidal neuron might have thousands of dendritic segments, as well as an axon, tens of thousands of synapses and scores of various ion channels.

As a pilot project, however, the Mahwold/Douglas silicon neuron was successful on several counts. First, it ran in real time. This meant that Mahwold and Douglas could conduct experiments by tweaking parameters in real time, such as the density of a given type of channel. Second, the neuron's output behaviour for varying amounts of current (displayed on an oscilloscope) closely resembled that of a real pyramidal cell under various physiological conditions. Third, the neuron consumed little power.

The successful debut of a single synthetic neuron has made possible several other potential developments: by adding more compartments (corresponding to dendrites) and a wider range of ion channels, you could improve the synthetic neuron's computational capabilities. Another possible development is that of building many neurons on a single chip. You could then explore synthetic neural circuits to learn more about the computational possibilities inherent in various parameters.

Ideally, you should be able to tweak thousands of parameters in real time; thus, interfaces need to be flexible and user friendly. Using synthetic circuits would mean that you could explore neurons in virtual reality rather than having to watch points appear on a graph on your screen.

A further refinement would be to make the chip able to learn from experience. Then, instead of having to hand-set neuronal connections, you could use a training regime. Mead and his group are currently developing trainable chips that can modify connectivity based on learning certain rules similar to those believed to underlie plasticity in nervous systems. Here, plasticity refers to a property of a neuron's body that undergoes a permanent change in shape, size or composition under certain conditions.

Ultimately, you will want to create chips with subpopulations of neurons specialised for different tasks, in the manner that distinct brain regions — including visual cortex, auditory cortex, motor cortex, and so forth — are specialised. Learning from the ways that nature engineers specialisation and integration functions should provide valuable information.

Following nature's lead may require that people model patterns of neuronal connectivity, both long-range (on the order of cen-

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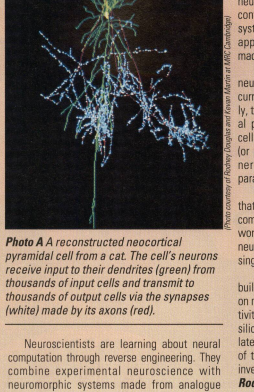
Silicon neurons

Neurons in the living body have electrical and chemical mechanisms that let them act together to represent and respond to behaviourally significant physical events. Over time, neurons have learned to manipulate how their membrane conducts various ions to produce electrical events that form a basis for computation.

Neuronal systems compute in fundamentally different ways from electronic computers. Neurons are massively interconnected. The neurons shown in the reconstructed neocortical pyramidal cell (see Photo A) receive input to their dendrites (green) from thousands of input cells and transmit to thousands of output cells via the synapses (white) made by their axons (red).

Neurons operate in the millisecond range rather than in the nanosecond range. The human brain generates 10^{16} operations per second (compared with the supercomputer's 10^9 operations per second). But the power consumption of the brain is only 10^{-5} joules per operation (compared with an electronic processor's roughly 10^7 joules per operation).

The perception of an object is an unsolved computational problem. The vast majority of neural computations as complex as perception are less than 100 operations deep. This fact reflects the essentially distributed nature of neural computation, in which algorithms express themselves as connectivity and processors are indistinguishable from memory. Certainly, it seems that people can learn about computing from the field of biology.



(Photo courtesy of Rodney Douglas and Kevan Martin at MRC Cambridge)

***Photo A** A reconstructed neocortical pyramidal cell from a cat. The cell's neurons receive input to their dendrites (green) from thousands of input cells and transmit to thousands of output cells via the synapses (white) made by its axons (red).*

Neuroscientists are learning about neural computation through reverse engineering. They combine experimental neuroscience with neuromorphic systems made from analogue CMOS VLSI technology. Fortunately, the physical properties of analogue CMOS are similar to those governing the electrical behaviour of neurons and neural systems. Therefore, analogue CMOS is a convenient medium for building neuromorphic systems, just as the properties of Lego make it appropriate for constructing structures and machines.

For example, we fabricated a generic silicon neuron that emulates the fluxes of the ionic currents that occur in real neurons. Consequently, the silicon neuron has the same computational properties (at the neuronal level) that real cells do. The neuron can emulate the behaviour (or personality) of any particular neuron in the nervous system simply by setting several parameters.

One exciting feature of the silicon neuron is that it behaves in real time, regardless of its complexity or the number of neurons in the network. We are currently working to build many neurons, initially about 100 to 200 neurons, on a single chip.

In the not-too-distant future, we anticipate building networks of thousands of silicon neurons on multiple chips, with personalities and connectivity that can be modified in real time. Using these silicon neural networks, we will be able to emulate intelligent circuits in the brain (such as those of the visual system) and provide a test bed to investigate realistic learning mechanisms.

Rodney Douglas and Misha Mahwold

timetres) and short-range (millimetres). Nervous systems are remarkably fault-tolerant: a circuit and its ability to function can survive the death of individual neurons within the circuit. Artificial systems might be able to achieve comparable fault tolerance if they are made to imitate the brain's connectivity, modifiability and processing style.

Neural circuits in silicon

Peripheral sensory organs (such as the eye) are highly specialised parts of the body that translate external physical signals into electrical activity. The retina is a powerful preprocessor that transforms information about photons into a form suitable for neural representation and computation.

In a number of animals, sensory transducers and preprocessors are about as sensitive as they can become. For example, in primates, photoreceptors in the retina will respond to just a few photons; the human ear can pick up sound close to that of Brownian motion. Powerful analogue preprocessors shape the information into a neural-friendly form — but can they be reverse-engineered?

Mead has built a family of silicon retinas. Each silicon retina is a VLSI chip that is a square centimetre in area, weighs about 1 gram, and consumes about a milliwatt of power. Between arrays of phototransistors etched in silicon, dedicated circuits execute smoothing, contrast enhancement and motion processing. The chip operates in its subthreshold, analogue mode.

Compared with a typical CCD (charge-coupled device) camera and standard digital image processor, the Mead chip is a paragon of efficiency in performance, power consumption and compactness. A special-purpose digital equivalent would be about the size of a standard washing machine. Unlike cameras that must time sample, typically at 60 frames per second (fps), the analogue retina works continuously without needing to sample until the information leaves the chip already preprocessed.

Operations performed with Mead's chip capture some of the functions that real retinas perform; however, real retinas contain many more circuits than Mead's synthetic one.

While it makes sense to build chips to maximise efficiency in the three critical elements — power, cost and density — you must still push analogue VLSI techniques a long way to approximate neural efficiency. The incentive to go forward with this technology will depend on whether the payoff looks promising in the long term (see table on page 134).

Neuro-revolutions

We are on the brink of two neuro-revolutions: one in the science of the brain and the other in the technology of brain-style computing. Knowledge grows exponentially: the more you have, the more you gain — and the faster you get it. The same applies to neuroscience. Almost every day, surprising discoveries about the organisation and mechanisms of nervous systems are being reported.

The VLSI revolution has provided computer science with unprecedented tools to transform what we know about the brain into silicon. Silicon retinas are in production, silicon cochlea are nearing production, and oculobots (robotic eyes) are on the drawing board. Although it is nearly impossible to predict future technological breakthroughs, ever-more sophisticated neuro-engineering is in the offing.


?
ANSWERS

What constitutes an effective EIS?



Traditional MIS is built on recording historical data. Today's increasingly complex market forces, however, dictate that a company's information resources must inform on not simply what has happened, but what comes next.

Dorothy Parker once wrote in a book review: ``This book should not be tossed aside lightly; it should be hurled away with great force.'' Such is the case with existing business procedures. They are legacies of the past, irrelevant to current conditions; they are laden with the burdens of history and years of accreted complexity . . . If we accept conventional definitions of our problems, we will never find solutions to them.'' (Dr Michael Hammer, Hammer and Company).

``Decisions are about the future, and prospective information is not historical numbers, it's ideas and assessments of our key people – the soft information. We need an EIS that is more than a recycled MIS.'' (Prof Cyril Brookes, Office Express).

One of John F Kennedy's major bequests to the world was the enduring exhortation to ``ask not what your country can do for you – ask what you can do for your country.''

In the same manner, and with equal passion, the considered advice of your faithful scribe is . . . ask not what an EIS is, but what it can do for your company – because the number of different answers you will receive for the former question only depends on how many times you ask it. To some, it's a product, to others, a strategy, or a series of carefully evolving implementations, and for still others, it's an outmoded concept. Some view it as an idea which now needs to be acted upon, while others consider it to have been superseded by a new set of business practices and tools.

BY HELEN DANCER

Certainly, the recognition of the importance of executive information systems (EIS), using the term loosely, has been promoted by relatively recent advances in technology and the rise of the 'virtual office'. Geographical independence from the four walls traditionally regarded as the place of business has made efficient technology-enabled communication even more vital to the normal processes of the business day. Smaller, lighter, more powerful PCs, and the advances made in pen-based computing, where even the style and passion with which the notes were made can be recorded for better communication of the text and subtext of the message, have brought access to processing of many forms of information to a technologically and geographically diverse range of people.

The rise of electronic mail (to the point where it is showing the fastest rate of market acceptance, superseding even word processing), and the steady growth in popularity of other messaging technologies, both demonstrate and support the feasibility of executive information or decision support systems within the current business framework.

The quantum increase in information has also made it improbable that individuals or teams can stay informed without some technology enabling. The question then comes back:

What constitutes an EIS in today's terms, and how will it help?

EIS in its original form is a transmutation of the classical MIS, a processing room-oriented, mainframe-based department which served as repository and guardian for the company's data-based resources. Highly skilled analysts and programmers manipulated this data and extracted and packaged information in formats to suit the sales, marketing and financial departments, and reserved the right to preside over the data and hold jurisdiction over manipulating it in this prescriptive way.

Increasingly competitive market forces, however, dictate that a company's information resources must inform on not simply what has happened, but what comes next. More than ever, an effective EIS is one which will pick up and deliver information before it affects the business. This is not a backward-looking, retrospective reporting system, but one which will identify potential problems before they affect sales.

Traditional MIS is built on recording historical data. Today's information systems needs are for much more than this, and involve knowing what the market is doing and how the business fits in — a more proactive approach to information collection and assessment. This is not to say that the processing and storage of data, and the trends analysis which such compilations allow is no longer relevant, but simply that this alone no longer defines what a company needs from MIS, or an EIS.

Questions concerning where you are now and where you came from are readily answered by traditional MIS. It's the issues of closeness of competition and hidden potential threats — issues that are more strategic to business in the '90s than they ever have been before — that cannot be taken with a relational database, however good it might be at its job.

Out of the '80s

As with most issues of change, it is useful to take a brief look behind us. Peter Cole of the EIS consulting services division of Price Waterhouse, has charted the history of products and developments to offer an overview of the transition from MIS to EIS and indicate why we may be on the threshold of better systems.

If a great idea happens on the factory floor, given the current hierarchical structure, there is little chance of the idea getting to the person who is actually empowered to make a decision on it.

The financial services group, of which Cole's division is a part, specialises in implementing software packages and optimising their use for individual clients. He describes their function as a synthesis that has formed them into technical accountants, configuring both the accounts and the data to achieve the desired result in each case. Cole draws a parallel between this function and an EIS: "In the same way, although you can buy a package that is an EIS, it is just a shell. It is still necessary to place all the logic into it to make it work in individual cases. These shells, languages databases are all unique in their ability to provide time-series analysis and multi-dimensional viewing, so they can be used for modelling and 'what if' scenarios."

Most traditional EIS software has come, according to Cole, from financial modelling or operations research-type engines, but the market is being carried along on the undercurrents of new technologies. The impact of new trends — such as the interest in being able to model an enterprise, as well as the more widespread development of graphical front ends, making analysis available to a wider spectrum of users — will change the vision and the value of an EIS.

Rapid growth in the market for what has been referred to as an EIS has already happened, Cole believes. Growth in availability of products plateaued out in 1989, with sales lagging this trend and then being substantially quashed by the recession.

"The initial flush gave people good ideas, which then had to take a back seat to the bigger problems, such as survival. This has, in the main, now happened, and we have a new order of business.

"Let's say that the businesses that are going to survive are those which have already undertaken their restructuring."

In essence, this is the key. The restructuring that has occurred has given rise to a different type of management and different needs — no longer for glossy front ends to everything, but for greater access and more penetrating capability.

EIS is better applied when it is not just an executive tool, but when those capabilities are available in different levels of the company. Decision Support Systems (DSS) will be used more frequently to configure data in a way that will make it easier to produce multidimensional views and apply some value to see its implications.

Indeed, the pro-active approach is, it seems, the missing component: the bridge between what we accept as an MIS and what we expect from an EIS.

If a great idea happens on the factory floor, given the current hierarchical structure, there is little chance of the idea getting to the person who is actually empowered to make a decision on it. The EIS-enabled ideal would be to ensure that the idea would filter through to the decision-making level — not to the extent that management needs to search for it, like an unquantified needle in a haystack, but that it nevertheless hits home.

Second, and significantly, an effective EIS should be liberating enough, and able to promote enough self-determination and momentum, to redefine the tasks of the people who have been trying to solve data-based problems and allow them to focus on the future.

According to Glen Jobson from Clear Technology, "EIS is what frees up eight of the nine people you have managing your network or system to focus on taking the company forward technologically, which is why you hired them in the first place."

Enterprise-wide

'Enterprise-wide' is a prevailing catch-phrase which encapsulates the information system that will best support new business structures, and which, if effective, holds the key to the new vision of EIS. Apart from being a

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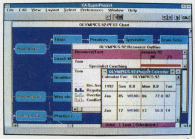


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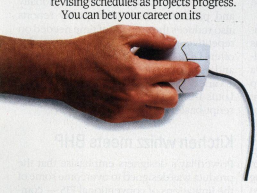
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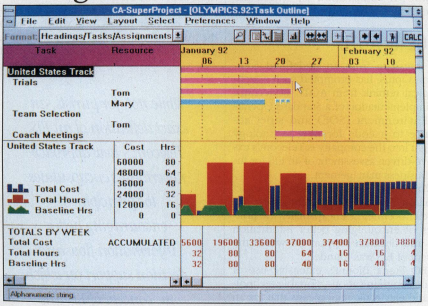
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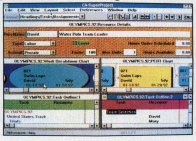


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means by which vendors are trying to sell their wares to the marketplace (a phrase that is an acknowledgment that what they have to offer reflects the changes that have occurred in business structure), it is a reminder that if a company is going to put these systems in place, then to serve any real purpose they must be available to any level, not simply the decision-making echelons.

Post-recession, or 'climbing-out-of' recession business in Australia is not unique. Complete changes in business culture and cost structure denote different means of managing. The difficulties come in establishing the status quo — in assessing who the known competition is, where the potential threats lie, and where they stand.

A SOE for AOTC

New pressure from an undefined competitor, Optus, has prompted such a technological rethink from AOTC (Telecom). The implementation of a Standard Operating Environment (SOE) and strict adherence to a code for new technology brought into the company is Telecom's executive-driven assessment of an EIS for future business management.

While not, for EIS purists, an exact definition of an EIS, Telecom's new approach nevertheless encapsulates the principles of encouraging better information flow and decision support on which the concept of EIS was founded.

CEO Frank Blount's extensive use of mobile communications, portable technology and electronic mail means that for an executive support system to work for him, his team must have equal commitment to the technology so that they, or their information, are responsive to his needs for their time or knowledge.

The SOE has engendered significant business relationships with Microsoft, (the strategy is based on the Windows environment), as well as ITG Networks' Desktop Solutions, the company that is charged with implementing the system.

Plans are under way to build custom-made EIS-type functions from the shells of applications such as mail to provide users at all levels of the company with forwarding and automatic reporting facilities, allowing them to use standard technology to best effect and expand the frameworks in which these can be created, from the traditional financially-based applications.

Financial whizz kids

It is not surprising, however, that of all the products currently available for developing EIS systems, many are still financially based. Most of those proffered for examination for this feature were elegant, sophisticated variations on spreadsheet technology, revealing a system that still thinks like an accountant, even if it doesn't look like one.

Probably the most appealing of these, not only because of its ability, but because of the enthusiasm of its user base — many of whom had never had any desire to use a computer — is an Australian-made EIS called Control Room.

Although the terms 'dicing' and 'slicing' seem more relevant to culinary than financial analysis, if you want to talk EIS, you have to learn them.

Control Room is based on the input of information into a series of methodologies that are deliberately simple and will produce an analysis of activity-based costing — in other words, one which reflects the true costs of business. Given this input, the user can then 'slice and see' at any point

While not, for purists, an exact definition of an EIS, Telecom's new approach nevertheless encapsulates the principles of encouraging better information flow and decision support on which the concept of EIS was founded.

what production is really costing, and how these costs relate to margins, profit, any other expenses and the desired result. Restructuring of the profit line can be analysed, as the system will take the user backward and demonstrate what production costs, together with what volume of sales and margins, are required to boost the business to those levels.

Without doubt, Control Room's most enthusiastic user is Philip Halloran, who runs Queen Brooms in Tumut. Prior to being advised by his accountant that there was a system called Control Room that would help him track and manage his business more productively, Halloran had never used (nor ever wanted to use) a computer, and only thought about them in the context of processing words. He lamented the volumes of paper and the complexity of the system which Control Room has replaced, saying that his biggest fear was that the person who administered it would suddenly be away and that he would have to tackle it himself.

Control Room, on the other hand, has established a paradigm of Halloran's business allowing him to walk away from it at any stage, knowing that his staff would understand not only how to operate the software, but more importantly, understand the need for continually analysing the business in terms of production costs, overheads and margins.

"It's not just a question of finding out after the fact that that model of a broom costs too much to make, it's about deciding how to make more on it, or having the information to decide whether, in that case, you should still be making it at all," Halloran said.

It's this capability that places Control Room firmly in the category of an EIS — its ability to deliver decision-making information to the people who need to make it, regardless of whether those people qualify as 'executives'. For Halloran, the feeling that he has had a system installed that is capable of indicating to any of his staff the business paradigm which ensures the continuity of his successful broom-making has meant that the system has made a difference. For Queen Brooms, and many others therefore, it's the perfect DSS.

High dive into the data pool

Two other products that have received much market acceptance are Computer Associates' CA Compete! and Cognos' PowerPlay.

CA Compete! is a multi-dimensional spreadsheet that facilitates the viewing of information from many different perspectives, and the interrelationships between data without the traditionally cumbersome redefinition and modification. CA Compete! is an integration of spreadsheet and database technologies, allowing easier access to data modelling as well as viewing.

The spreadsheet is object oriented in design, making models easy to understand, and revisions and redefinitions more precisely relevant to the business environment that it describes.

The ability to apply formulae globally and produce presentation-quality reports also reduces the amount of time needed on repetitive procedures. CA Compete! also offers DDE to other Windows applications, and users can import and export files from a variety of formats, including SuperCalc, Lotus 1-2-3 and Excel, as well as ASCII and script-based files.

Kitchen whizz meets BHP

PowerPlay's designers emphasise that the product was designed to overcome some of the limitations of conventional EIS — complexity and cost, as well as the difficulties of design and maintenance. As a self-styled

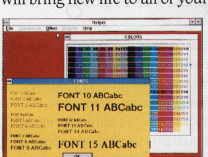
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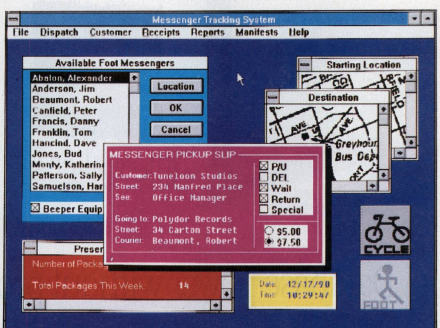


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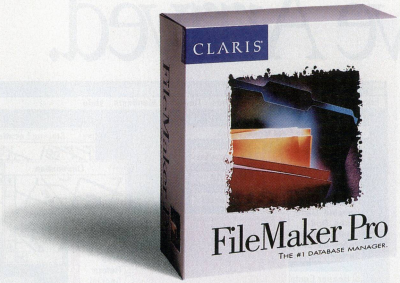
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A decision is a snapshot of good business processes

Bob Johansen probably has the longest perspective on EIS, having studied the concepts and early implementation some eight to 10 years ago. In his role as the leader of the programme charged with making sense out of new technologies at the Institute for the Future on the northern edge of Silicon Valley in California, Johansen studies and nurtures new technologies until they emerge from the cocoon to commercial reality. In Australia for Lotus Notes, to bring the message that the Institute's latest focus, groupware, has well and truly emerged from this future tech cocoon, Johansen outlined some of the classic assumptions and limitations of traditionally perceived EIS, and pointed to some of the aspects essential to better enterprise-wide information management . . .

"What the technology provides us with is a mirror, with which to look at ourselves. Very often, we don't like what we see. The more sophisticated applications allow us to manipulate the image of what we have to something which better suits our perspective. What is healthy is that it allows us to ask what kind of support we really need and evolve what we have to suit these more complex needs.

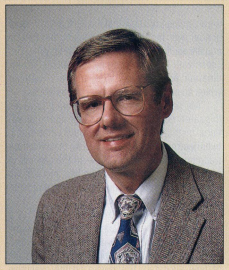
"Because you basically start from pain; pain is a great motivator. Everybody talks about future technology and what is going to happen next, but images of the future don't motivate change. The best technologies are evolved in the short term, and proven in the long term.

"A white board is an exact replica of a meeting's contents, not only with the words, but also the spirit and essence of the context. The very way things are written and the different handwriting imply joint effort and involvement, not to mention the depth of feeling with which the message was conveyed. No secretarial recording in minutes of the meeting format can replicate the totality of that meeting's essence, so something is lost. And that something is important — the very way it was written forms part of the group memory. So someone out there has invented a synthesis between photocopier and camera technology, which together can take an exact picture of the white board and preserve not only the words, but their subtextual meanings. Such simpler ways of better recording are down-to-earth pain relievers.

"The time and investment to design a product like this must be worth it in the long run, but you need to keep asking the question at each stage. In the meeting scenario, there is a rationale for it, in terms of the value of the information you are saving. The value of people's time is, after all, a multiple of what you are paying them. In the US at least, it's estimated that managers spend between 30 to 70 per cent of their time in meetings, making those meetings an extraordinarily expensive commodity. Think, too, about how much time is wasted in post meeting misunderstandings — about who said they would do what, and by what date. If you could take the camera and photograph the white board, which was a representation of the proceedings, and if you could get each of those participants to sign the board to say it was a true and correct representation of the discussion, the value of the time that is then not wasted in misunderstanding is significant.

"That's information technology — but it's not the preconceived, high-level, complex, programming-oriented concept of IT that most people have and are afraid of.

"Developments such as the PC, video games and computer-bungled bills have made computers seem a lot more down to earth. And in business, where computers used to be the exclusive domain of data-processing professionals, the PC has jammed open the door to the computer room. Computers are too important to be consigned to the back room and left to a single department. Those data-processing departments that have resisted this evolution have become like mailrooms — a repository for all the operations that nobody else wants to do. The more progressive companies have computer-savvy people on the executive floors, sometimes disguised as chief information officers (CIO), and sometimes disguised as normal executives. The latter approach is usually more effective.



Johansen: "What the technology provides us with is a mirror, with which to look at ourselves. Very often, we don't like what we see."

Continued on page 148

'desktop EIS for the entire management team', PowerPlay offers a series of 'exploration techniques' to allow executives more definitive access to the supposedly uncharted territory of the factory floor.

Take heart — the digging and drilling is carried out automatically. PowerPlay offers data packaged in dimensions and defined according to the nature of the business — Locations, Products, Distribution Channel, etc.

Mouse-driven 'drilling' allows access to the information that is underlying trends and processes, allowing companies to get right back to the rationale on which those processes are based. Slicing and switching shows the information in different dimensions and highlights the implications of the raw data, or of combinations of factors.

Both products take advantage of the graphical user interface of Windows to offer their analysis capability to a wider audience and shorten learning curves with the aim of increasing the productivity, both of the user and the information.

Both products are excellent information management tools, offering a company many different perspectives on the information it knows it needs, rather than being a repository for those intangibles which, though undefined, may nevertheless have a significant impact on business.

For the record

Apart from the drilling, slicing and switching — that is, the number-crunching capabilities of decision support systems — the preservation of organisational memory is another concept crucial to an effective EIS. PKF Corporate Systems, a division of Pannell Kerr Forster, has developed the Corporate Register System (CRS) that is designed to do precisely this — and more. The CRS deals with company reports and records, information for and about shareholders, registered offices, human resources and audit information.

The system reduces repetitive processes, producing company forms, minutes, consents to act, share certificates, etc, from statutory records, reducing both the time taken and the risk of transcription errors. It also prints information in formats required by the Australian Securities Commission.

The ability to share and store, secure, use, and re-use information in this way thus qualifies the CRS as fulfilling some of the functions of an EIS. As with the other products discussed, which refine and support the decision-making process, it is possible to regard such systems as executive information or decision support systems with one proviso: the recognition that these are no longer definitive because of the revised business structures into which such a system must fit — the new 'executive' is a team, not a person.

A decision is a snapshot of good business process

This is a funny zone, however; executives realise the necessity for IT-assisted globalisation, and strategic inter-business alliances, and they're sure that IT can help, but are not sure how. To further complicate matters, they don't quite trust the IT department — more precisely, they don't trust their traditional perception of the IT department, and in any case, this traditional function is coming under scrutiny.

"My perception is that groupware is set to recast the mess around information systems: to create processes and procedures that will actually support business teams. The healthy part of that scenario is that it is a technology that executives can understand. More worrying is how the technology will be delivered for this reason.

"In the short term, the problem is that the technology looks simpler than it is, so the executive perspective is, 'Oh, I know this, so I don't need an MIS department anymore', — a point of view that is obviously a fallacy. Optimising the technology is a lot more complicated than simply using it, and the ways in which it will be used and the people who use it are more wide reaching, so the concept of an MIS, or an EIS, if you like, is vastly different.

"I used to believe in EIS a lot more than I do now. The idea of an EIS as an isolated data-oriented analysis machine is no longer, I believe, really possible, or, indeed, what executives really want.

"A lot of senior executives make decisions from unspoken knowledge or intuition, or from group input. Having a lot of data just makes it worse, it confuses or delays the decision which you often know is intuitively right.

"The loss of middle management, which is widespread, is a compelling motivator in the implementation of an effective data-management capability. There's a song from the US about what we are going to do now that the buffalo have gone, and all over the world it's a lament that can be equally applied to middle management. Why? Because with them go two key concepts — co-ordination and organisational memory, without which an organisation is rendered powerless.

"My perspective is that groupware provides this safety net, of both co-ordination and organisational memory, and, in fact, provides what executives need more fundamentally than that which we traditionally regard as an EIS — not just access to more data, but more understanding, more group input, and more support and development of intuitive decision making.

"Every executive I know is running on a deficiency model. There are more things to know and more information to be absorbed than can possibly be assimilated by one person in the space of time allocated. Groupware on the executive floor can provide the leverage of people resources that executives have and could have.

"Groupware, then, redefines EIS because it alleviates the problem of leveraging decreased and dispersed people resources to make better qualitative decisions.

"This brings us to the question of who uses groupware. Senior executives don't fly solo as much as people think they do. Robert Reich recently wrote in *Harvard Business Review* about the 'team as hero', and the idea that the executive is often the personification of a group decision or strategy. It's a very valid perspective; the reality is that often the decision maker is not one person, nor that the person didn't come to the decision on his own. Therefore, organisations are inherently in need of groupware, as a trustee of their co-ordination and organisational memory.

"In a two-way grid that charts importance on the horizontal and urgency on the vertical scale, and from low to high on each axis, the point at which Very Important meets Very Urgent is found where most executives spend most of their time. So, in effect, they are spending time looking backwards, or on things that other people think are important. In fact, executives should be spending most of their time at the point where the high-importance axis meets the low-urgency axis. This is the stage at which they can become visionaries, and, fundamentally, the ability to discern their better use of time on such a grid defines the difference between leaders and managers; leaders primarily trust other people to be managers.

"The quest for EIS is not easy. Emerging technologies are difficult to name; if it's an easy task, you know they are probably not worth studying. EIS, as it is required today, is poorly named — it implies — and was probably originally designed as — a single-user data machine for executives. What is really required is an executive support system, which is more than data: it's other people's knowledge, impressions and instincts, as well as group input.

"EIS, and providers of conceptual EIS, must recognise the fact that executives don't work by themselves.

"I'm not even sure that the decision itself is the most important thing — maybe what's more important is the process leading up to the decision, and the giving and taking from the organisational memory which happens in that process.

"By the time the decision is made, it is often anti-climactic, or factors involving a rethink have occurred, so the decision has most value not in its own right, but as proof that the company has set up good processes. In other words, the decision taken becomes a snapshot of good business process."

Support for group decision making

From his perspective of having seen the concept of EIS pass through the microscope of the Institute For The Future in the early '80s, Bob Johansen (see 'A decision is a snapshot of good business processes' on page 147) asserts that groupware, or technological support for group decision making, is in the current business climate, a much more valid and useful way of approaching the needs that the concept of EIS traditionally tried to meet. Group support, he says, rather than a single-user data-analysis tool, will provide stronger, more rounded decisions on which a company can prosper rather than merely survive.

In the groupware stakes at present, there is no doubt that Lotus heads the field. Its strategy, Lotus Notes, has seen over two years (one in Australia) of commercial availability, and as a vehicle for the simple or complex synthesis of information (rather than simply a set of sophisticated but discrete tools), it has no peer. After last month's analysis of the various group-computing tools on offer, the analogy of placing six Volkswagens end to end and expecting the performance of a Porsche springs to mind. The two cars come from the same company, but there the similarity ends. Likewise, the performance of a bundle of applications whose functions may represent the various group-computing ideals will nevertheless not deliver the same tight integration and facility to customise applications to individual use, which is the essence of an effective executive information or decision support system.

Conclusion

If the evolution of EIS is perceived to have been a long time coming, we're not to be misled into the belief that the wait is nearly over. "When the market designs an effective EIS," according to an analyst from one of Sydney's leading consulting firms, "I'll be out of a job." He is not proffering his résumé yet.

There is a (probably apocryphal) anecdote ascribed to the introduction of messaging systems in the early '80s, which applies equally to the redefinition of today's requirement for EIS. The story begins with the CEO of a large North American computer company who asked his senior executives whether they would benefit from a computerised diary/calendaring system. Their enthusiasm was overwhelming. They vowed that the interconnected electronic diary would replace their paper-based systems and that this would be the road to successful inter-organisation communication. The company subsequently put the new system in place.

After two months, the CEO called a meeting electronically, and attached a file



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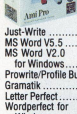
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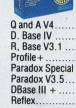


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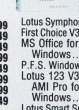
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EIS for the PC environment from a restructured MIS

Computer Associates has the peculiar habit of taking people out of the jobs they are accustomed to, and placing them into others. The effect is not, surprisingly, of chaos and displacement, but a stretching of those minds and an increased ability to contribute their particular expertise in a different frame of reference. Thus it was that Paul Greening became general manager of the Micro Products Division of Computer Associates after years in the mainframe world.

From his perspective as a former mainframe services provider, he looks at what the PC world needs from an EIS . . .

"We are finding ourselves in an environment in which vast numbers of users are coming to computers for the first time, while others are migrating from large systems, such as the mainframe environment.

"So the solutions and support that is required for these people's computing is as far removed from traditional MIS as it can possibly be. This is not to say that MIS is inherently inefficient, only that the evolution of users demands a new response.

"Take the analogy of the man who made the last stagecoach — he probably made an absolutely splendid one, but he's no longer in business. In the same way, the processing strengths of the traditional mainframe-style computers no longer represent the focal point of the use of technology. So how ever good they might have been, processes which only support this are no longer appropriate.

"There are serious business reasons to move to the desktop, and the human face of the PC is one of them. Mainframes will endure, I believe, despite the mass migration to the desktop and portable market, if only as gigantic file servers for far-reaching LANs.

"In the current technology environment, it's the word 'middle' that is under threat — midrange systems and middle management. In companies going through the exercise of downsizing, people are still using their mainframes and surrounding them with desktops for a more human face to their computing environment. The EIS that is required in these circumstances is much more interactive. Years ago, when we talked of MIS, we had regular reports from the cost centre, unit/quantity reports, profit and loss statements, and so on. Today, we have moved towards a scenario of Critical Success Factors — CSFs — a much more Japanese model of business management. The traditional way is to perfect a process and stick to it, whereas the more realistic way is to regard it as an ongoing evolution.

"Instead of having 'hard coded' processes, in which the CEO says, 'These are the specifications that will deliver the information I require today', but the information only takes him to the end of the next chart or graph, an EIS should support the formation of CSFs, which may be met or superseded in a short space of time and must give way to others to keep the business flowing.

"Therefore, the traditional concept of middle management is under threat because the CEO is



now demanding to have access to the base line data, not the prepackaged information.

"The new business structure is following the philosophy that things are continually moving, and today's effective EIS is anything which supports people's work processes in that environment of continuous change.

"No-one can afford to throw out everything they have and start again. Therefore, a serious business EIS must involve an evolution rather than a revolution. Hard-wiring processes and procedures are counterproductive because the nature of business sees them change after a few months or, because the problems have been quickly recognised through a supportive EIS, are able to be solved in a much shorter space of time, and are therefore no longer relevant.

"EIS is about refocusing the information you have so that it tells you what you need to know, as well as measuring the company's ability to improve this information management.

"In the last 15 years, the emphasis has been on speeding up processes and collecting data. We already have more information than we know what to do with. What we need are products and strategies that can customise the information you already have to address the CSFs of the moment. Because the various factors that affect the business may be constant — but they may not always be CSFs — it's only when you're going off the rails that the factors are critical, or strategic. When the problem is sorted out, you simply move on to the next one.

"When we recommend solutions, we recognise all the time that our customers are businesses — they can't just keep throwing money into the glasshouse. And here's a fundamental difference between the mainframe and PC environments — the PC environment is much more conducive to people actually 'owning' the technology, and therefore being responsible for optimising it.

"Having been in both, my perspective is that in the mainframe environment, information is still perceived as being owned by the developers — the boys in the ivory tower. People had, historically, a terrible phobia about the data centre, and a mental block about how to approach the mass of data under lock and key to get the information packaged the way they needed it.

"And this feeling of ownership can be illustrated in an interesting way. We ship products in large unattractive cartons. Perhaps these boxes become damaged on the way. In the mainframe environment, no-one seems to care — it just gets put in the glasshouse and used. But, on the other hand, when we ship a PC product, it has become a personal acquisition, right down to the condition the box is in when it arrives — something that represents an individual's tool for doing their job.

"EIS, too, has not been a personal acquisition — instead, it's something that has been imposed.

"People have, however, a flair for finding solutions. Most people know what they need. This is where the success lies: access to facilities by experienced people to do more, with fewer people around. The '80s was the era of specialisation, the '90s will be characterised by generalists, and these people's ability to do more, efficiently, will depend on support from EIS systems and transparent access to technology.

"EIS is about people, more than technology. Like the people-moving exercise that CA indulges in, packaging and repackaging information ensures that it's no longer too focused and has a broader use.

"EIS is also about access. There's a new breed of computing people who are looking at the way we ship product. At present, it comes as a set of disks and a manual. Soon, though, we'll be at the stage where access will permit users to acquire more software just by downloading it from the vendor, or from bulletin boards. The manuals will be a part of the software that can be printed out if required. But it should be even more accessible than that. I would say that the space of time an application has to win a user over is getting shorter, and we'll see a situation where users say, 'If I can't use it in 20 minutes without poring over the manual, it's not a hit'. It's like going into a record bar at a department store — if I hear some music I like, I'll probably buy it. And that's the time frame in which applications must appeal to their target market.

"In the end, we come back to the theory of evolution. In the beginning there were lots of tools and programming languages for the cognoscenti to design their own procedures. Then came the rise of applications and the migration of these applications to the desktop. Now we're seeing a resurgence of end-user development tools, and some of these tools are so good, they are encouraging users to develop their own customised products. We've come full circle — and I suppose an effective EIS will support us going around again."

Drilling down: this won't hurt a bit

Mary Brittain-White, general manager for Executive Decision Systems, a newly formed division of GEC Alsthom, has revised the aphorism 'no pain no gain' to a much simpler version — 'no pain'.

She stresses that corporate Australia is already in enough pain, and that the process of implementing executive information systems to help ease this pain shouldn't, as is too often the case, add to the torment . . .

"The pain is the problem. And the pain is more acute because the people charged with putting an executive information system in place are the ones who are already working until 4am fighting the fires that are presently raging. Why? Because the company is plagued with an information management system that is out of control. For one thing, the systems are not always connected for information flow, and the decision makers, who are usually removed from the coalface, definitely don't know anything. Another thing, executive information systems aren't just accounting or warehousing systems, total information providers rolled into one.

"Too often, we're guilty (as an industry) of selling different bits and pieces as solutions to part of the problem and saying, 'Well, there you are. That will do what you said you wanted', and then walking away. Getting people to own the problem, and technology providers to own responsibility for the implementation, has historically been just too hard.

"What we need is a strong emphasis on responsibility. It's the only way we will get past the problem of user cynicism.

"No EIS can be of the slightest value if the provider or the consultant is going to walk away and leave the user standing with a handful of products.

"But an EIS is nevertheless the key for executives to try to make a difference to their business.

"There are three important steps to getting it all together:

"First, you need to know what it is you want to control. These, though varying in importance from time to time, are nevertheless constant factors — factors such as sales, gross margins, profit, and the relationship between one and the others. For example, what margins do you need over what volume of sales, to drive the profit you expect over a given period of time? For business, this exercise is crucial.

"Second, you need a methodology for putting the information together, and third, in the end, you need to have someone to put it together for you. Why? Because the people in the company who you might rely on to implement the kind of system you need are already too stressed out trying to manage the problems with the system as it now exists. Sure, it may only take three days, but it's three days they don't have. So, in the end, they do their daily tasks and that's it.



Mary Brittain-White, Executive Decision Systems' GM: "The ability to know how core information interrelates is important. Only then can you really find out how the business runs."

"That's what Executive Decision Systems is all about — identifying the business drivers; those factors that are going to make a difference to the business, matching the products that are out there to those needs, and finally, putting the system in place and getting it to work in a way that actually makes a difference.

"The business structure has changed, and what we have dispensed with is middle management. The average redundancy per company is 27 middle management to about seven senior executives. And so you ask the question, what were they doing? On one face, they were collating a lot of information and presenting the various options, and on the other face, they were managing a lot of people. Which means that now they are gone, the span of control of higher executives has risen dramatically. Instead of the former ratio of 1:4 people, it's more like 1:12, which means that people management and reporting has also changed significantly. At the executive level, it's now less likely that you will have people to manipulate data for you — instead, you have a PC. The reporting is the same, but the time lapse is shorter. In the new business environment, you no longer have to make other people be more responsive.

"And this is why an EIS will work. A client in the UK implemented an EIS at ground level and then wiped out its middle management. The company streamlined the flow of ideas and cut costs at the same time. The strategy worked perfectly. But it was an extraordinarily courageous thing to do. In Australia, it seems that middle management is slowly being wiped out, without the EIS infrastructure being in place. And thus the pain.

"We're implementing a lot of systems based on Cognos' PowerPlay. The disk costs about $1200. Customers are seeing a payback time of about a month. But when you think about it, one wrong decision made from a lack of information can cost much more than that.

"The ability to drill down into your business to watch how core information interrelates is important. Only then can you really find out how the business runs. When your business is faced with an opportunity, you can't sit around waiting for the information with which to make a decision. It's necessary to respond within a decent amount of time if the proposition is within your own strategy. If it is, then you need to produce a model. But often, you dabble too long in discussion before you realise you should never have been interested because of the lack of reasonable tools for analysing what you know and don't know.

"It says a lot about the quality of management, as well — when you don't provide your people with adequate information and nevertheless expect them to make sound business decisions, you are expecting them to be entrepreneurs, but most people just aren't.

"Like 'groupware', I think EIS will be a buzz phrase for about two years, and after that, I think it will just be standard. We're at the stage now where the products have come around, they're not costing a fortune and they're no longer too complicated to contemplate. In other words, they have reached the accessible stage.

"An effective EIS will only tell you where you have a problem. It's still up to you to manage it. And then there's the concept of exception management — using an EIS to only do the bit that makes the difference."

that detailed what was to be discussed at the meeting.

On the appointed day, eight of the 20 executives turned up at the meeting, and only three were prepared to discuss the subject at hand.

Old habits die hard.

The disappointingly low 15 per cent acceptance rate after such initial enthusiasm proves that the technology alone is not enough, and that product excellence is tempered by the market's ability to re-invent its vision and examine its commitment and, more precisely, its commitment of time and energy to getting where it wants to be.

Furthermore, EIS is as much a strategic business relationship as a series of products, and the danger lies in alliances that are advantageous for the vendor but which suffocate the user.

A mature market has the capacity to drive production of the technology, rather than passively accept new developments from ivory (should that be silicon?) towers. Maybe a new structured, individually derived EIS is the beginning of this market maturity.

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Business users raise the expectations of desktop-based operating systems.

A few years ago, all that was needed for an operating system to gain acceptance was an inexpensive hardware platform and a good application base. Now, more complex factors come to bear. For instance, how easy is it to use and develop applications for? And how stable is its technology base? Driving this change is the trend among businesses to downsize. These companies are abandoning their minicomputers and mainframes for networked desktop systems. The personal computer is proving itself capable of handling mission-critical tasks, but the corporate customer wants more.

The sophisticated operating systems of mainframes and minicomputers, such as DEC's VMS or IBM's MVS, support multitasking, virtual memory, security, robust file systems and efficient system administration. All these features are incorporated into each of the desktop-based operating systems discussed in this State of the Art section. These operating systems — Microsoft's Windows NT, IBM's OS/2 2.0, Apple's System 7.0, Univel's UnixWare, NeXT's NextStep and SunSoft's Solaris – combine the best of the mainframe/minicomputer world with the best of the desktop world. The result is a relatively bulletproof system designed to be implemented on a large scale and able to run familiar desktop applications with a familiar user interface.

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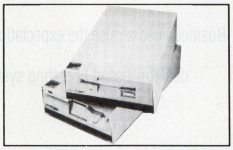
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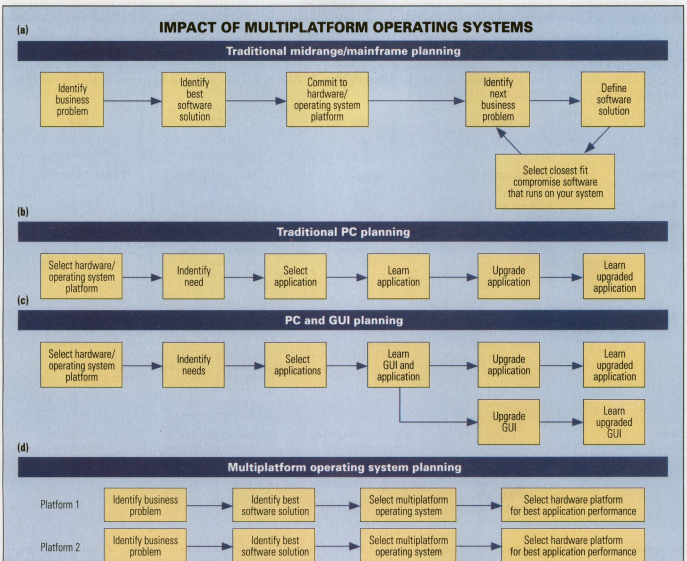
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(a) *In the traditional midrange or mainframe world, information systems planners were forced to commit to one operating system and hardware architecture early in the life of the system. Their future choices of software were limited by what was available on their chosen platform. Often, that meant the software was not the best available but was the best available for their platform.* **(b)** *With traditional personal computers, the breadth of applications available made better choices of applications possible, but each application had its own learning curve. User training became a significant issue in large organisations, and resistance to needless upgrading of applications became common.* **(c)** *The arrival of the GUI on personal computers eased the training problem by providing a more intuitive user interface that was consistent across many applications.* **(d)** *The impact of the multiplatform operating system on information systems planning will be to let customers first choose the application that best serves their needs and then choose the most efficient hardware platform to support it*

In competing for the corporate customer, hardware has become a commodity, and the operating system has become the vehicle for the competition. The latest manifestation of how the operating system is the focus of the competition for the corporate customer is found in Microsoft's Windows.

The server is the key

Windows covers a wide range of systems, from notebooks and pen-based computers to the desktop. Originally intended to make it easier for people to use the PC, Windows has now expanded its mission to form the foundation for a better server in client/server computing through NT (see 'Windows NT up close' on page 165). Mike Nash, NT marketing manager for Intel, describes the operating system as "kind of a best-of package. If you name all the things you would want out of Unix, VMS, OS/2, DOS and Windows, you will find they're all in NT." If it sounds like it's being developed as an ideal operating system for the server, that's because it is. All the serious operating system contenders are vying to succeed in the corporate market by capturing the server.

The server is a key to operating system marketing strategies because corporate networks are typically made up of a mixture of clients: accounting departments might use PCs, while the marketing section utilises the Macs and the engineering department uses Unix-based workstations. That mix is slow to change because existing equipment and their applications tend to be preserved whenever possible. So, the developer has a better chance of supplying operating systems on servers and allowing

The desktop evolution

The evolution of the desktop has to be viewed from the directions of the user, the hardware, and the typical applications and data handled. The earliest PCs were clearly desktop machines for the computer programmer. By the mid-'80s, the PC had become an execution platform for standalone applications, with a greater emphasis on ease of use. The PC of today is still mainly an execution platform (now for the GUI), but the productivity gains it enables have veered beyond the single user to benefit workgroups. By the mid-'90s, the desktop system will be well along in the transition from a personal data-processing station to a personal information-access station.

	1982	1985	1992	1994
CPU	8088	286	486 68040 RISC and SPARC	P5, RISC and multiprocessors
Storage	Floppy disk	Hard disk	Large centralised hard disk	Large hard server
Video	Black and white or CGA	EGA	24-bit colour	24-bit colour
User interface	Command line	Pull-down menus, command line, and private resources	GUI, local single user, workgroup user, and shared resources via LANs	GUI; virtual workgroups; shared applications, data and resources network; and personal, location-independent desktop
Applications	Single-task-oriented Lotus 1-2-3, and word processing	Graphics use growing, Lotus 1-2-3, word processing, DBMS and TSR utilities	Graphically oriented, multitasking, use of TSRs, data sharing/linking, word processing, spreadsheets, DBMS, presentation graphics, communications, and custom-made mission-critical applications	Multitasking, agents, document-based, mission-critical applications common, and video conferencing
Data	Text and numeric files; simple graphics; updates via sneakernet; and files over 100K considered huge	Text and numerical files, more sophisticated graphics, and more emphasis on the presentation of data	Graphically presented, accessed via LANs, and some sound	Search by content remote access, and multimedia

the operating system's performance to speak for its usefulness on new client machines. Witness the multiplatform support adopted by operating system developers (see the above figure).

Don't forget the developer

Another strategic target in the operating system competition is the applications developers in large corporations. These developers are the focus of two conflicting pressures: downsizing (and the scattering of corporate information system resources), and the increasing need to develop applications faster. The beleaguered developer presents a critical support issue and a strategic opportunity to operating system vendors. The operating system that best supports internal developers has a real edge in getting their company's business.

According to Mike Colleary, IBM's marketing manager for OS/2, "Corporations need applications that give them a competitive advantage, something that everybody and his brother can't buy off the shelf." Up to two million people worldwide are developing unique applications within companies, noted Colleary. Naturally, he sees OS/2's strength as a development platform.

Most corporate customers are no longer dazzled by the technology of desktop systems. They are no longer looking for raw technology; they want efficient tools.

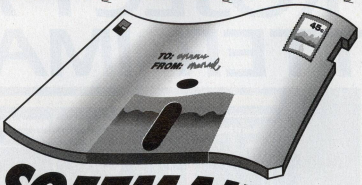
Support is critical

Once an operating system vendor has set its sights on mission-critical applications and corporate information systems, it must address a number of complex issues — issues that historically have had little to do with technology. This implies a higher level of support for the customer than simply delivering a shrink-wrapped software package. The catch is that while corporate customers may demand premium levels of support, they also demand low prices. The challenge for the operating system developer is to define a collection of capabilities that can reduce the cost of support without overburdening the operating system.

IBM's Colleary claims that this profile of the user is the model on which to build a support infrastructure. He said the operating system should be as transparent to the user as possible and offer accessible help functions.

This is a new paradigm. Corporate customers are accustomed to having fast, effective, and comprehensive service and support from mainframe and minicomputer vendors. When something goes wrong with mission-critical applications, they expect a fast solution.

Arun Taneja, vice-president of market-

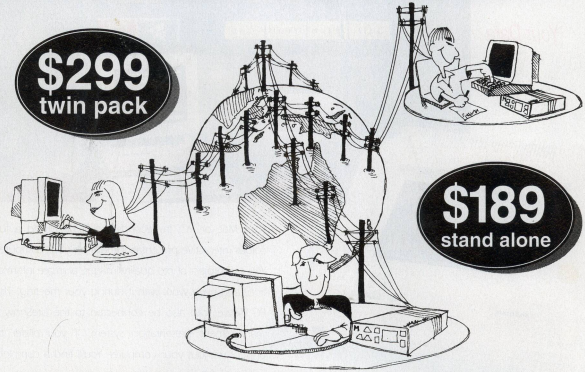


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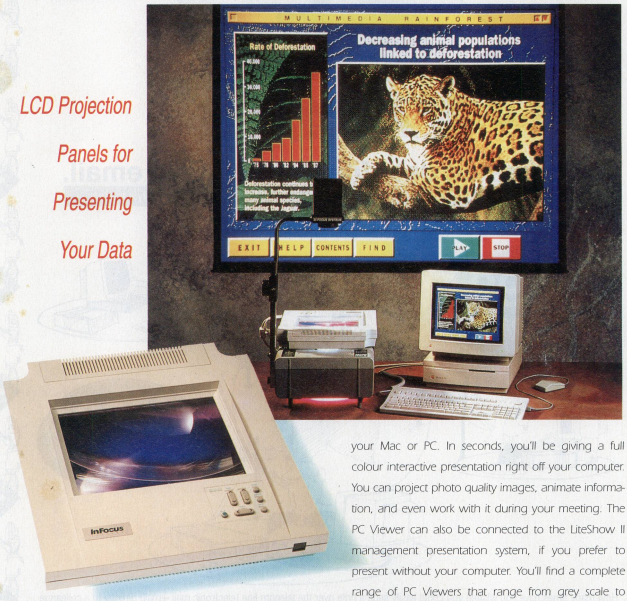
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WIN an IBM MULTIMEDIA PC

International Research Bureau and IBM are delighted to offer you the chance to win an IBM multimedia PC valued at $8,310. The configuration of the IBM multimedia PC on offer is:

PS/2 Ultimedia Model M57 SLC
386 SLC 20 MHz cached microprocessor
4mb of RAM, 160 MB SCSI hard disk, 3.5" 2.88 MB diskette drive, 14" colour display
600MB CD-ROM 11 drive, 16 bit audio adaptor card
PS/2 mouse, internal speaker, DOS 5.0, OS/2 2.0 Standard Edition, Windows 3.0 with Multimedia Extensions 1.0, Multimedia application samples.

Multimedia is at a very early stage of its development within Australia and you are invited to participate in this important research project aimed at clearly understanding your requirements for multimedia within the home environment. Results obtained from this survey will be used as an important decision making tool in the design of your next PC purchase.

All replies will be treated in the STRICTEST CONFIDENCE and no individual information will be released to a third party. For information on the survey please contact International Research Bureau on (02) 907 9331.

1. Classification of Household

Household Income

Less than $24,999	❑
$25,000–$49,000	❑
$50,000–$69,999	❑
$70,000–$100,000	❑
Over $100,000	❑

Family size

No children	❑
1 child	❑
2 children	❑
3–4 children	❑
5+ children	❑

Household Postcode _____

Occupation of principal income earner

Professional	❑
Manager	❑
Self employed	❑
Supervisor-foreman	❑
Technician-trade	❑
Clerical worker	❑
Semi-skilled	❑
Unskilled	❑

Do you use your home as your business office?

Yes	❑
No	❑

2. Inventory of office products in your home. Indicate which of the following products you have in your home.

	Have purchased	Plan to purchase in next 12 mths
PC	❑	❑
Photocopier	❑	❑
Fax	❑	❑
Typewriter	❑	❑

If you have a PC - Go to question 3
If you plan to purchase a PC - Go to question 6
Otherwise go to question 17

3. What type of home computer do you have?

Games machine (Nintendo, Commodore 64K)		❑
IBM PS1 or PS2		❑
Apple/Macintosh		❑
IBM/IBM clone PC	XT	❑
	AT	❑
	386	❑
	486	❑
Portable laptop computer		❑
Multimedia PC (inc. CD ROM & sound card)		❑
Other		❑

4. What is your home PC primarily used for?

Business activity (please est. % use)	% ❑
General home accounts, letters etc	❑
Home study	❑
Playing computer games	❑
Hobby	❑

5. Does your computer have any of the following multimedia components?

Sound board	❑
CD ROM	❑
Video board	❑
Video laser disk	❑
Number of CD Tiltes you own	❑

6. Are you planning to purchase a home computer in the next 12 months?

Yes, a new machine	❑
Yes, a second-hand machine	❑
No, go to question 9	❑

7. If you are intending to purchase a PC indicate type of computer.

Games machine (Nintendo, Commodore 64K)		❑
IBM PS1 or PS2		❑
Apple/Macintosh		❑
IBM/IBM clone PC	XT	❑
	AT	❑
	386	❑
	486	❑
Portable laptop computer		❑
Multimedia PC (inc. CD ROM and sound card)		❑
Other		❑

8. What will the PC be used for?

Business activity (please est. % use)	% ❑
General home accounts, letters	❑
Home study	❑
Playing of Computer Games	❑
Hobby	❑

9. Are you intending to purchase any of the following multimedia products in the next 12 months?

Sound board	❑
CD ROM	❑
Video board	❑
Video laser disk	❑
Number of CD Titles	❑

10. Listed below are groups of applications being developed for multimedia. On the grid below please indicate which of the following may influence you to purchase a multimedia PC.
Pleas tick all that apply:

	Unlikely	Might	Very likely
Education			
Education for children	❑	❑	❑
Adult education	❑	❑	❑
General knowledge, encyclopaedia, atlas	❑	❑	❑
Other	❑	❑	❑
Please write in _____			
Games/general interest			
Entertainment games	❑	❑	❑
Electronic books	❑	❑	❑
Other			
Please write in _____			
Hobbies			
Music	❑	❑	❑
Editing home video from VCR camera	❑	❑	❑
Produce home slide shows from pictures	❑	❑	❑
How to do 'Video Book' e.g. Car repair	❑	❑	❑
Other			
Please write in _____			

11. Please rate the following multimedia product options for their desirability
Please tick all that apply

	Highly desirable	Desirable	Un-desirable
Ability to play high quality CDs from PC	❑	❑	❑
Ability to view TV programs from your PC	❑	❑	❑
Ability to connect music keyboards	❑	❑	❑
Ability to output to your own VCR (home movie production)	❑	❑	❑
Other			

Please write in _____

12. Where did you purchase or intend to purchase your home computer from?

General department store	❑
Electrical retail store	❑
Speciality computer store	❑
PC dealer	❑
Direct from vendor by fax/phone/mail	❑

For each of the attributes listed below please rate the supplier's performance of your PC
1=excellant, 2=good, 3=average, 4=poor, 5=very poor

	1	2	3	4	5
The knowledge of the sales people	❑	❑	❑	❑	❑
The demonstrations given to you	❑	❑	❑	❑	❑
The display area for the PCs	❑	❑	❑	❑	❑
The availability of brochures/support material	❑	❑	❑	❑	❑
Options offered with the PC	❑	❑	❑	❑	❑
The finance package offered	❑	❑	❑	❑	❑
Information on support options	❑	❑	❑	❑	❑
Training options offered to you	❑	❑	❑	❑	❑
Education software	❑	❑	❑	❑	❑
Selection of software for PC	❑	❑	❑	❑	❑

13. If you have purchased a home computer in the last twelve months please rate your satisfaction of the following:

Please write in brand name _____
1=excellent, 2=good, 3=average, 4=poor, 5=very poor

	1	2	3	4	5
Quality	❑	❑	❑	❑	❑
Performance	❑	❑	❑	❑	❑
Reliability	❑	❑	❑	❑	❑
Value for money	❑	❑	❑	❑	❑
After sales service	❑	❑	❑	❑	❑
Documentation	❑	❑	❑	❑	❑
What is your overall satisfaction	❑	❑	❑	❑	❑

14. If you have used IBM's OS/2 or Windows over the last 6 months please rate the following:
Please ***tick*** the one product used most frequently:

IBM OS/2	❑
Windows	❑

Please complete for the most frequently used product.

1=excellent, 2=good, 3=average, 4=poor, 5=very poor

	1	2	3	4	5
Ease of use	❑	❑	❑	❑	❑
Compatibility with DOS software	❑	❑	❑	❑	❑
Overall performance	❑	❑	❑	❑	❑
Overall reliability	❑	❑	❑	❑	❑
The features of the software	❑	❑	❑	❑	❑
The ease of installation	❑	❑	❑	❑	❑

15. When buying a PC which of the following sources of information do you use to assist in your purchase decision?
On the grid below please rate each of the following sources of information.
1=very useful, 2=quite useful, 3=not very useful, 4=useless, 5=not used

Your–	1	2	3	4	5
Children	❑	❑	❑	❑	❑
Relatives and friends	❑	❑	❑	❑	❑
Colleagues	❑	❑	❑	❑	❑
Daily newspapers (including computer sections)	❑	❑	❑	❑	❑
Computer magazines	❑	❑	❑	❑	❑
Television	❑	❑	❑	❑	❑
Radio	❑	❑	❑	❑	❑
Outdoor advertising	❑	❑	❑	❑	❑
Manufacturers' literature	❑	❑	❑	❑	❑
Distributors' catalogues	❑	❑	❑	❑	❑
Sales people	❑	❑	❑	❑	❑
Directories or product buying guides	❑	❑	❑	❑	❑
Other	❑	❑	❑	❑	❑

Please write in _____

16. How important are the following attributes in your decision to purchase a home computer?
1=very important, 2=quite important, 3=not very important, 4=irrelevant

	1	2	3	4
Price of computer	❑	❑	❑	❑
Brand name of product	❑	❑	❑	❑
Disk size	❑	❑	❑	❑
CPU type	❑	❑	❑	❑
On-board RAM	❑	❑	❑	❑
Colour screen	❑	❑	❑	❑
Speed of CPU (Mhz)	❑	❑	❑	❑
CD ROM player integrated	❑	❑	❑	❑
Clear and complete documentation	❑	❑	❑	❑
Free software included	❑	❑	❑	❑
After sales service reputation	❑	❑	❑	❑
Credit terms to pay off	❑	❑	❑	❑
Warranty option	❑	❑	❑	❑
Rental	❑	❑	❑	❑

Please write in _____

THANK YOU FOR COMPLETING THIS SURVEY

To be entered in the draw for the IBM multimedia PC please give your name and day time phone number.

Name _____

Number _____

Please mail this questionnaire to
Multimedia Survey
GPO Box 7052
Sydney NSW 2001

CONDITIONS OF ENTRY

1. Instructions on "how to enter" form part of these Conditions of Entry. Entry is free and open to all residents of Australia other than employees of ACP Publishing Pty Limited, IBM and International Research Bureau, their families and associated agencies.
2. Entries for the draw close 1st December 1992. The draw will be conducted by the International Research Bureau in the presence of its company auditors on the 10th December. The result of the draw is final and binding on every person who enters. No correspondence will be entered into.
3. Only one entry will be accepted per household. Entries may be on the original form or photocopied version.
4. The promoter is International Research Bureau of Summerset House, 42 Wakehurst Parkway, Seaforth NSW 2092. All entries become the property of International Research Bureau.
5. The prize is valued at approximately $8,310 and consists of an IMB multimedia PC. The prize is not transferable or redeemable for cash. Any change in the value of the prize occurring between the publishing date and the date the prize is claimed is not the responsibility of the promoter.
6. The prize winner will be notified by telephone and published in the January edition of APC.

ing for Univel, predicts that "the guy who is going to provide that cradle-to-grave service is the one that is going to win in terms of satisfying the MIS community and the Fortune 1000 community." Univel is targeting the systems integrators and system hardware OEMs as well. Taneja says that all the largest systems integrators are working with NetWare and are familiar with Unix, a situation that greatly improves Univel's chances of acceptance for its desktop operating system, UnixWare.

Corporate change

Most corporate customers are no longer dazzled by the technology of desktop systems. They've travelled the path of the PC evolution (see the above table). These customers are no longer looking for raw technology; they want efficient tools. Corporate customers expect their tools to work consistently and at the least possible cost in time, effort and money.

The current wave of what is variously referred to as re-engineering, rightsizing or downsizing has one immediate goal — to reduce the cost of doing business. Downsizing directly affects the development of operating systems by the changes it makes in both the information systems infrastructure and the expectations of the people who own and use those systems. The other key motive behind corporate downsizing, heard most often from those users who prefer the term re-engineering, is the flexibility that it offers.

The infrastructure of corporate information systems, at least for the purposes of this article, can be viewed from three perspectives — what it does, who supports it and who pays for it. The move in recent years from mainframe-based information systems to those based on minicomputers and microcomputers was a user revolution driven by cost (primarily of the computing hardware), freedom (of information access and exchange), and focus (the mainframe-based information system focussed on corporate-level problems, often ignoring department-level problems).

It has to be multiplatform

Changes in information systems have driven corporate users to clamour for technical solutions to their problems. When there's less money and fewer people to throw at problems, what's left but technology? One of the technical solutions that corporate users are now asking operating system developers to provide is the multiplatform operating system.

Operating system developers can no longer afford to support just one hardware platform. A successful sale of PCs to a large installation represents big revenues to the operating system developer — too big to be tied to the fate of any one hardware platform.

Network-dependent applications

As you migrate from a simple PC on a desktop running only personal productivity applications to enterprise-wide systems, each level adds user benefits. From a technology viewpoint, the transitions between these levels can be achieved through incremental additions. But from the corporate customer's perspective, each level adds other issues that a mission-critical system must address.

For an application in a networked environment to be robust, all the network's resources must be managed. It becomes a more difficult and costly implementation process. For advanced operating systems, the key question that network-dependent

MOTHERBOARDS – CHECKLIST FROM ABC PERIPHERALS

ABC Computer Co. was founded in 1983 to manufacture and export a wide range of PC products on an OEM basis, including motherboards, super i/o cards, video cards and ethernet cards.

Production is located at a 2,700 square metre headquarters in Kwai Chang, the New Territories. Instead of relying on mass production in China, the company became one of the first in Hong Kong to use SMT.

With a workforce of over 300, it has become a high-end design firm concentrating on exploring new ideas, their design and product technologies, and the manufacturing of high-end products. The company has a scientific quality management scheme – an after-sales marketing team to monitor the product design and production quality including maintenance of detailed production and repair records of each product. Quality control includes 24-hour burn-in test at 40C, Novell QA audit, system functional tests and final system QA audit.

ABC Peripherals was set up in Sydney last October to service numerous clients trading with the head office. Since then, Australian distribution has increased ten-fold due to assurance of consistency in supply, quality of product, and local support.

The company has expanded and moved to bigger premises to cope with increasing sales and product range.

ABC Peripherals has devised a checklist for PC assembly or upgrade in the quest for the perfect motherboard.

CPU. Intel and AMD are the most advanced main chips in the market. ABC uses AMD for 386SX and 386DX, Intel for 486SX and 486DX board). DXL CPU uses less power and reduces the chance of overheating.

BIOS. Make sure the board has legal AMI BIOS to ensure compatibility with most applications in MSDOS, DRDOS, OS/2, Xenix or Unix and check compatibilities with network software. ABC boards are tested on Novell, 3COM, D-Link and Lan Manager.

COPROCESSOR OPTION. The board should accommodate either the Intel (and clones) or the Weitek numerical coprocessor to enhance system performance with asynchronous or synchronous clock selection.

CMOS. The battery/CMOS partnership must be stable to ensure CMOS values are not lost intermittently. Check capabilities of CMOS and Advanced CMOS. Does it include password protection?

CHIPSET. Look for a highly integrated chipset which contains cache controller, memory controller with fast page mode operation, speed-selectable bus controller etc.

BOARD CONSTRUCTION. ABC boards are constructed with 6-layer PCB using SMT. 386DX and 486 boards come with a short-proof protective lining. The boards are standard baby-sized with mounting holes to fit most cases.

EXPANSION SLOTS. ABC slots have programmable synchronous AT bus speed for maximum compatibility with add-on cards.

MEMORY. Board must support mix of DRAM types: 256K, 1MB and 4MB SIMM modules. ABC 386 boards can handle up to 16MB Ram, 486 boards to 32MB Ram.

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applications raise is how much of that network management responsibility should the operating system assume?

The operating system forms the foundation of the networked environment, and the system management functions, such as configuration, installation and administration, become applications that lie on top of the operating system. But the operating system must be tailored to support network-dependent applications.

Information systems professionals are accustomed to having the access and controls that are provided by large host environments. What they are looking for is a stable operating system on the server and a stable, multifunctional operating system on the client. They want applications built on top of an operating system so that they can easily manage the networked resources.

For example, Colleary points to OS/2's Crash Protection feature, which protects the networked system from massive failure in response to an application crashing on a client. If an application running on a client pulls down your entire system, "you're not talking about a person being unable to work, you're talking about the entire organisation or department not being able to function," Colleary said.

Corporate operating system requirements

- Ease of use
- Ease of application development
- Multiplatform support
- Support for legacy applications
- Familiar user interface
- Stable technology base
- Security
- Vendor service and support
- Ability to work in a distributed enviroment
- Efficient system administration

The SDK comes first

Windows NT goes into beta testing this month, but Microsoft has already started shipping the Software Development Kit, giving developers the opportunity to create 32-bit applications earlier. That approach is different from the old practice of shipping a new operating system and its development kit simultaneously. With the current approach, developers will have been able to test the API and create solid applications for the new operating system much sooner.

IBM is also paying attention to the need for early information in support of a new operating system. For OS/2 2.0, it conducted an early development program that included 30,000 sites worldwide. Each site gained experience with the operating system and fed back its requirements to IBM for transition into OS/2 code.

Future directions

Virtually all the operating system developers are pursuing new technologies, such as support for multimedia applications. Delivery of some of these capabilities will require changes in hardware platforms or customers' information systems. Some of the emerging technologies will be resource-intensive, perhaps requiring changes in the operating system to efficiently handle new tasks simultaneously.

If the convergence of the worlds of computing, telecommunications and TV occurs as expected, the huge sales volumes of the consumer markets will become a dominating influence in the directions taken in operating system development. But until the buying power of the consumer has been tapped, the needs of the corporate customer will set the course for operating system evolution.

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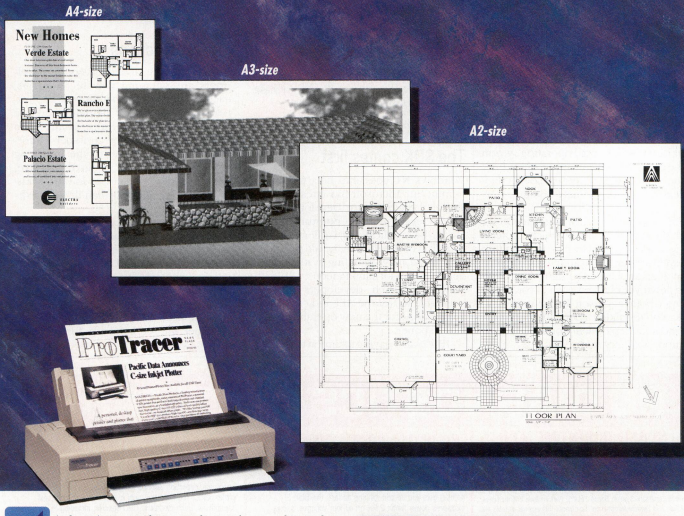
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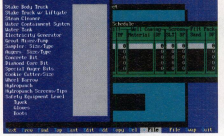
Windows NT up close

BY JON UDELL

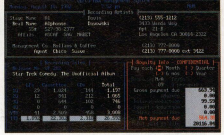
An in-depth look at Microsoft's next-generation operating system.

Microsoft's Windows NT operating system first booted in November 1989 on a hot RISC CPU and sported a next-generation interface. The CPU was Intel's 860. The interface was IBM's OS/2. Three years later, as NT nears commercial release, Microsoft's allegiance has switched to the MIPS R4000 (along with uniprocessor and multiprocessor Intel 80x86 boxes) and, of course, to Windows. Some observers of the often seamy soap opera that has played out over the last few years question Microsoft's ethics. Others merely acknowledge the company's astute software engineering.

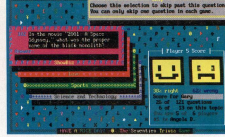
NT is, by careful design, a chameleon. Inspired by Mach, its microkernel adapts readily to any CPU and hosts various layered operating systems: 16 and 32-bit DOS, 16-bit Windows, 16-bit OS/2 (character mode and 80x86 only), Posix, and a 32-bit Windows-and-OS/2 hybrid called Win32 (see figure on following page). Because Win32 inherits the Windows 3.1 APIs and extension libraries, including OLE, the DDU Management Library, TrueType and the multimedia extensions, Microsoft claims (and developers working with early versions of NT emphatically confirm) that 3.1 applications port readily to NT. When NT ships, it will not only run existing DOS and 16-bit Windows binaries, but also Win32 versions of many popular Windows applications.



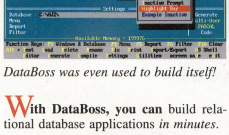
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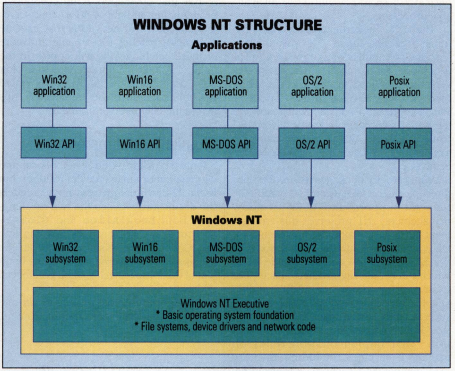
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What's the catch? Well, don't be misled by the term microkernel. While the NT kernel is a petite 60K, the full system (as of the July beta) requires 12M of RAM and prefers 16M. Although it will probably shrink by the time it ships, NT's resource appetite will be well beyond what is standard for the corporate desktop.

You might think that makes NT look mainly like a platform for server applications. Clearly, it's going to cross swords with Unix, NetWare and OS/2 in that arena. But effective enterprise computing requires capable clients as well as capable servers. Users may not need all of NT's high-end features, such as SMP (symmetric multiprocessing) and disk striping. Nonetheless, NT promises to eclipse DOS/Windows in terms of robustness, responsive multitasking, security, network awareness and configuration management. If it delivers, many companies will conclude that these benefits more than justify the cost of hardware upgrades to support NT on the desktop.

Whether or not they have already standardised on Windows, businesses are waiting for a system that stays up reliably, can be remotely upgraded and reconfigured, and can smoothly integrate and dependably run DOS and Windows applications. Although both OS/2 2.0 and NT have the horsepower, NT offers two key advantages: it can adapt quickly to the leading-edge Intel and non-Intel hardware, and it directly supports the most popular interface — Windows.



Windows NT layers a group of operating system emulators on top of a common set of services. The NT executive manages memory, processes and other primitive objects for the subsystems that emulate the Windows, OS/2 and Posix APIs, as well as for the applications that use those APIs

Basic building blocks

Whether it finds itself running on a uniprocessor or a multiprocessor, a CISC or a RISC system, the NT kernel sees the same view of the underlying hardware, thanks to a substrate called the HAL (hardware abstraction layer). There's a standard HAL for 386/486 AT-bus uniprocessor systems and one for R4000 uniprocessors. Makers of systems that break new ground must write HALs to support NT on their systems. NCR has written two: one for its four-processor 3450 and one for its eight-processor 3550. Compaq has written a HAL for the dual-processor Systempro, and Wyse has one for the three-processor 7000i. The HAL makes each machine's system bus, DMA controller, interrupt controller, system timers and memory model look the same to the kernel. It also delivers the support needed for SMP.

The HAL can't perform alchemy, however. An SMP system requires that all processors have identical instruction sets, views of physical memory and access to devices. Further, the hardware must provide cache coherency, and the processors must be able to interrupt each other. The HAL can't create symmetry out of an asymmetric set of parts.

The kernel, riding on top of the HAL, manages scheduling and context switching, exception and interrupt handling, and multiprocessor synchronisation. It is not pageable or pre-emptible.

The object-based architecture that is NT's hallmark flows from the kernel, which provides two classes of primitive objects. Dispatcher objects, such as threads, events, mutex semaphores and timers, maintain a signal state and support scheduling and synchronisation activities. Control objects, such as processes, interrupts and device queues, carry data structures used by device drivers and the NT executive, which is the interface to user-mode subsystems such as Win32.

The kernel reserves some of these objects for internal use and exports others, such as processes, threads, events and semaphores, to the executive, which packages them on behalf of user-mode subsystems. When a Win32 program asks the executive to create one of these objects, the executive encapsulates the raw object it received from the kernel — for example, by assigning it a name and a security descriptor.

The kernel maintains data structures that support scheduling, such as a queue of threads that are ready to run and a matrix that describes running threads and their priorities. In an *n*-processor SMP system, the kernel guarantees that the *n* highest-priority threads will be running.

NT's scheduling is event driven. When something interesting happens to a user thread (for example, a keyboard input message or notification that an asynchronous I/O operation has finished), its base priority receives a temporary boost and then gradually settles back to its normal state. This mechanism helps NT accommodate the unpredictable demands placed on it by users and devices. During quiet times, the kernel creates artificial events to keep things perking along. When it pre-empts a thread to run one with a higher priority, the kernel can assign the ready thread to any available processor. It favours, however, the CPU on which the thread last ran, just in case that CPU's secondary cache contains data still valid for the thread.

The executive dishes up a stew of basic services common to all the operating system emulations layered on top of it. These include security, memory management, I/O, file systems and IPC (interprocess communications). Like the kernel, the executive runs with supervisory privilege. Unlike the kernel, it is multithreaded and pre-emptive. NT achieves substantial parallelism on SMP machines even when it's executing single-threaded applications because the work of supporting those ap-

plications is spread evenly across all available processors.

The HAL, the kernel and the executive run in supervisor mode. The operating system emulation subsystems, however, run in user mode. Each of these environment servers, such as Win32, OS/2 and Posix, has its own private, protected address space. A Win32 application is a client with respect to the Win32 subsystem and must rely on IPC to use its services. Win32, in turn, maintains a client/server relationship with the NT executive.

Windows 3.x packages its services into three modules: GDI (graphics), KERNEL (general support) and USER (window management). NT preserves this arrangement but splits the modules into client-side DLLs, which map into the address space of Win32 applications, and server-side DLLs, which run in their own address spaces. For example, the client-side USER module enables applications to call API functions, such as **CreateWindow**, but the server-side USER module implements the function. That implementation relies on executive services, including memory management and security. For example, because a window is one of the objects to which NT attaches security, the **CreateWindow** call will ultimately invoke the executive's object manager and security subsystem.

The IPC mechanism that NT provides for these client/server interactions is an RPC (remote-procedure-call) protocol called an LPC (local interprocess call), which operates locally rather than across the network. Applications talk to their environment servers through LPC ports, and servers talk to each other and to the executive in the same way. Note that applications are tightly coupled to their supporting subsystems. Tantalising though the prospect may be, there's no way an OS/2 or Posix application can call the Win32 API or vice versa.

Although NT is not yet a distributed operating system, its structure of communicating parts clearly points in that direction. Although first-generation NT systems won't be distributed, what are the benefits and costs of NT's client/server approach for standalone systems?

Modularity is an obvious benefit. Subsystems are literally snap-in components. If Microsoft decides to add an OS/2 Presentation Manager layer (an off-again, on-again promise), the support DLLs could, in principle, be plugged into an unmodified NT base. Performance is the obvious cost: it's expensive to switch contexts between client and server on every API call. But the kernel does provide a fast context-switching mechanism that pairs up a client thread with a server thread and enables the two to trade states (running and waiting) with minimal overhead. Microsoft also recommends that developers rethink Windows programming in light of NT's client/server model. There are new APIs that execute GDI calls in batches, for example, and more of these batching APIs will appear in the final release. Programmers need to exploit these and also cache return values where possible to reduce the number of trips across the client/server boundary.

Thanks for the memory

NT preserves the Windows 3.x Local and Global memory management routines, but its flat 32-bit virtual-memory model renders the distinction between the two meaningless. Both **LocalAlloc** and **GlobalAlloc** return 32-bit values pointing into the 2G virtual address space that's visible to each process (the kernel reserves the other half of the 4G space that a 32-bit pointer can address).

There are three other ways to allocate memory. The standard C runtime routine, **malloc**, works just fine in NT because there's no need to worry about near versus far pointers. And two new mechanisms, the Heap and Virtual routines, offer additional control beyond that which the Windows 3.x API provides. Using the Heap functions, you can grab a chunk of memory and suballocate smaller chunks within it. This approach is handy for programs that deal with lots of objects smaller than the 4K pages that are the NT's fundamental memory-management unit. It's also a way for a DLL, which normally allocates memory in the address space of its caller, to maintain its own private heap. The Virtual functions offer direct control over NT's virtual-memory mechanism.

NT's synchronisation objects are standard constructs implemented in Unix, OS/2 and other operating systems. What's noteworthy about the NT implementation is its polymorphism.

As with OS/2 2.0, pages can be in three states: free, reserved and committed. A process can reserve, or preallocate, a set of pages in the virtual address space and commit the physical pages to support those pages. This scheme works well for expandable data structures. NT exploits it, for example, to enable thread stacks to grow automatically. The Virtual API also enables processes to query and set the protections that govern committed pages.

NT also provides a feature that is found in some versions of Unix, but not in OS/2: memory-mapped files. To use a memory-mapped file, you create a file-mapping object, which refers to a disk file, and create a memory-mapped view of the file. Why bother? The view permits random memory-oriented access to the file's data — a major programming convenience. More important, memory-mapped files are NT's primary mechanism for sharing memory among processes.

Windows 3.x programs, running in a common address space, share memory by default. NT's more robust architecture, which isolates processes from one another, requires an explicit means of sharing. Memory-mapped files offer an interesting solution to the problem. One advantage over OS/2's shared-memory mechanism is that shared storage automatically persists in the form of the disk file that backs the mapped view. If you don't need or want that feature, you can create a mapping object using the special file handle -1. NT will point views mapped on that object directly at the system paging file.

Both the NT loader and the cache manager that supports all the NT file systems are heavy users of the memory-mapping service. That's just one example of something that seems generally true: NT is, in many respects, its own best client.

Processes, threads and DLLs

As in OS/2, threads are the dispatchable agents of execution, and processes form the context, such as an address space, a security profile or a set of shared objects, in which that execution occurs. NT imposes no limit (other than available memory) on the number of threads a process can spawn. Because thread execution is conceptually (or, in the case of SMP systems, actually) concurrent, programmers have to carefully synchronise the way threads access shared data. Unix and OS/2 software developers already know the drill; however, for programmers who have grown up with DOS and Windows, it's a new discipline — and, in all probability, the biggest conceptual hurdle that NT presents.

A programmer can synchronise threads running in a process by using a critical section. Once a thread claims ownership of a critical section that (purely by convention) guards a shared data object, it can safely modify the data. Other threads requesting ownership must wait until the owner relinquishes its claim.

Three additional objects — mutexes (mutual exclusions), semaphores and

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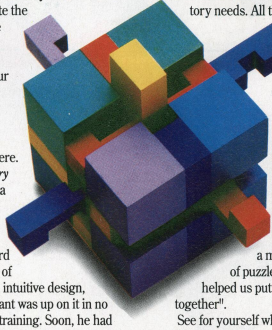
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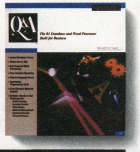
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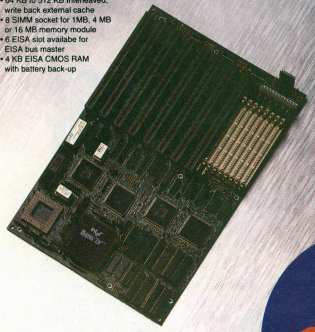
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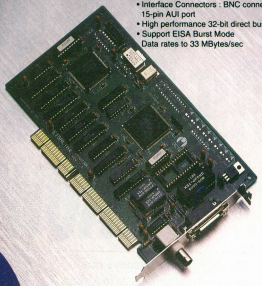
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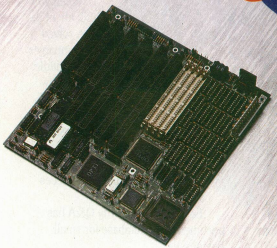
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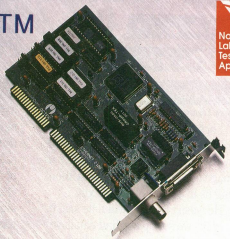
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events — support both intraprocess and interprocess synchronisation. The latter technique relies on the objects' names, which are visible across process boundaries. Each object type has its own flat namespace, distinct from the file system's namespace.

A mutex object is a shareable version of the critical section. Threads vie for ownership of a mutex and agree to modify the shared resource it guards only when they own it. A semaphore maintains not just a simple binary state (owned/not owned) but also a counter. A server application that limits the number of client connections it can accept might use a semaphore to enforce that limit. An event object alerts one or more threads that something interesting, such as an I/O completion, has occurred.

NT's synchronisation objects are standard constructs implemented in Unix, OS/2 and other operating systems. What's noteworthy about the NT implementation is its polymorphism. All synchronisation involves waiting: a thread waits until it owns a mutex, until a semaphore's count is non-zero, or until an event occurs. The Win32 API maps all these waiting behaviours onto a single function call, which can operate on a mutex, a semaphore or an event. Another function waits on a set of objects that collectively describe a compound condition.

These same two waiting functions also work with other types of objects. When applied to a thread, for example, the result is like a `join` in Unix: termination of the thread satisfies the wait. This polymorphism is both elegant and practical, and it flows directly from NT's object-based underpinnings.

Each thread created by a Win32 application has its own message queue, in contrast to the shared message queue of OS/2 PM and Windows 3.x. OS/2 PM's input model, derived from that of Windows, requires a multithreaded graphical program to dedicate a special thread to servicing the message queue. If that queue isn't continually drained, other applications starve for input, and the whole OS/2 PM interface hangs.

NT's per-thread message queues solve this problem. If a thread fails to service its queue, only the windows that are owned by that thread will suffer. Windows that belong to other threads respond normally, as you can prove with a simple experiment.

If you start a lengthy search in the Win32 version of File Manager, for example, you will see the familiar 'I'm busy' hourglass. This occurs because File Manager(32) is a straightforward port of File Manager(16), which is single threaded (ideally the Win32 version should spawn a background thread to perform the search). However, when you move the cursor outside File Manager's frame window, the cursor reverts to normal, and you are free to interact with windows owned by other applications.

Key features

- Portability
- Symmetric multiprocessing
- C2 security
- 32-bit Windows support
- Peer networking
- DCE-compliant RPC
- OS/2 and Posix support

Future enhancements

- B-level security
- OLE 2.0
- PM subsystem

Drawbacks

- Current command-line scripting
- No integral 3-D graphics API

In Windows 3.x, a DLL shares its automatic data among all processes that load the DLL. In NT, a DLL maintains instance data: one copy for each calling process. To optimise the sharing, NT bundles the instance data as a set of copy-on-write pages, lazily allocating a second copy of a page only when the owning process writes to the page. NT also introduces the concept of thread local storage, which enables processes and DLLs to stash private per-thread data. The DLL model changes slightly from that of Windows 3.x to accommodate these two flavours of private storage. NT notifies a DLL when a process or a thread attaches to it or detaches from it so that the DLL can (if necessary) create or destroy instance data or thread local storage.

File systems and device drivers

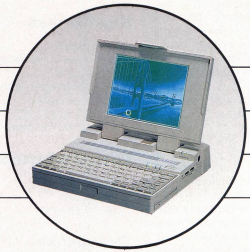
NT supports three file systems: FAT (file allocation table), HPFS (High Performance File System — OS/2), and the new NTFS (NT File System). All share a common caching mechanism and can use the same fault-tolerant driver to achieve spanning or striping across multiple disks. The term fault tolerance is a misnomer, though, because neither of these techniques improves data reliability. You will need to upgrade from Windows NT to LAN Manager NT if you want mirroring, duplexing or striping with parity (RAID [redundant arrays of inexpensive disks] level 5). Still, it's impressive that the base product lets you stripe data across a set of disks or join disks to create one logical volume. Even more impressive is that the fault-tolerant driver is simply a layer inserted between the file systems and the disk drivers, which know nothing about spanning or striping.

This layering of drivers pervades NT. At the device level, drivers for a class of device, such as a SCSI device or a network adaptor, use a port/miniport model. The



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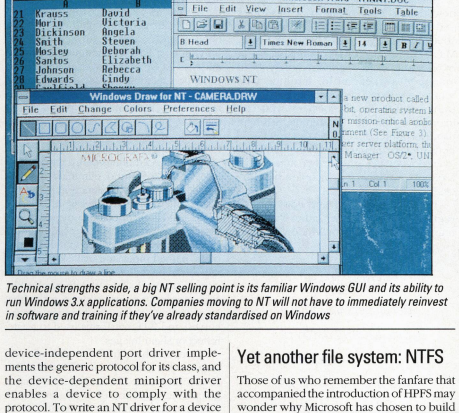


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Technical strengths aside, a big NT selling point is its familiar Windows GUI and its ability to run Windows 3.x applications. Companies moving to NT will not have to immediately reinvest in software and training if they've already standardised on Windows

device-independent port driver implements the generic protocol for its class, and the device-dependent miniport driver enables a device to comply with the protocol. To write an NT driver for a device class that's supported by a port driver, you need only write a miniport driver. Because you write it in C, the miniport driver can easily move to any NT platform (and, Microsoft hints, to a forthcoming DOS 6.0 as well).

The task is simplified because the port driver handles a lot of the hard work. In particular, it helps sort out tricky thread-synchronisation issues in an SMP environment where the thread that detects an interrupt and the thread that services an I/O request can run on different processors.

Will all this work as advertised? The proof will be in the pudding. If NT ships with rich support for a wide range of devices, you'll know that the layered driver model works. Note that NT already supports nearly all the printers that Windows 3.1 does, by virtue of having ported 3.1's umbrella printer driver, UNIDRV.

Device support is typically the Achilles heel of a new operating system. If NT succeeds where OS/2 failed, Microsoft will have knocked down a major barrier to NT's commercial acceptance. By the way, NT device drivers and protocol stacks will load and unload at runtime — a feature that NetWare 3.x supports but that OS/2 and most Unixes do not. Drivers that can be loaded at runtime are convenient for users and critical for servers that must run continuously and reconfigure on the fly.

Yet another file system: NTFS

Those of us who remember the fanfare that accompanied the introduction of HPFS may wonder why Microsoft has chosen to build yet another file system. NTFS and HPFS are close cousins in many ways: both support long (255-character) filenames, use extent-based allocation and b-trees, and store attribute data.

But NTFS adds key strategic features — most notably recoverability. It logs all operations that affect the structure of a volume (that is, creating, destroying, or extending file or directories) and treats them as atomic transactions against a database called the master file table. The log file is circular, and NTFS checkpoints it periodically to bound the worst-case recovery time. In the event of a crash, it replays the log to restore the file and directory structures existing at the instant of the crash and rolls back any transactions that were incomplete at the time. Because its journal changes, NTFS can recover a volume in seconds, as opposed to minutes for an HPFS **chkdsk** or even longer for a Unix **fsck**. Note that NTFS doesn't guard user data, and (initially) there won't be any APIs that applications can use to leverage NTFS' transaction tracking for their own purposes.

NTFS uses 64-bit addressing, so volumes and even individual files can grow to a healthy 17 billion gigabytes (versus 2G for HPFS). It stores filenames on disk in Unicode, the 16-bit international standard that NT applies to all of its internal character data.

Finally, NTFS is the only file system that NT can make secure. The mechanism NTFS uses to attach security descriptors to its files and directories is a generalisation of the extended attributes of HPFS. An HPFS file can hold up to 64K of extra data configured as a set of name-value pairs read and written by a special API. An NTFS file can contain multiple independent I/O streams, or data attributes. Standard file APIs operate on these streams using the syntax FILENAME::STREAMNAME. Each stream has its own size and locks, although sharing occurs on a file-by-file basis.

File-system security is just the first application of NTFS attributes. They'll also prove useful for implementing foreign file systems on NT. Macintosh resource forks, for example, should fit neatly into NTFS. VMS-style file versioning would be another good use for these attributes. In the long run (1994 and beyond), a variant of NTFS will handle the storage requirements of the distributed, object-oriented, next-generation Windows that Microsoft refers to as Cairo.

Spy versus spy

When NT ships, it will be C2-certifiable. Wheels turn slowly at the National Computer Security Center, so certification may lag behind product release. A C2-secure system provides discretionary access control: the owner of an object dictates how other users may access it. More stringent B-level security — a future goal for NT — would require mandatory access control, which means that objects must carry sensitivity labels that govern access according to a systemwide policy.

The NT object model supports a uniform implementation of security and auditing across a broad swath of object types — such as files, processes, threads, semaphores, windows and menus — as well as DDE, named pipe, and RPC transactions. When an application creates or opens a reference to a securable object, NT verifies that the object's security descriptor grants the application's user access. If the check succeeds, NT caches the resulting granted-access mask for the rest of the user's session.

A key feature of NT security is that applications can extend it to user-defined objects. For example, a database server might create its own security descriptors and attach them to its tables. In addition to normal kinds of read/write security, the server could secure database-specific operations, such as scrolling within a result set or performing a join. It would be the server's responsibility to define the meaning of special rights and perform access checks. But the checks would occur in a standard context, using systemwide user/group accounts and audit logs. The extensible

security model should prove useful to those who implement foreign file systems, such as NFS (Network File System) and Macintosh.

To simplify the use of security in client/server applications, NT introduces the notion of impersonation. If client and server talk through an RPC connection, the server can temporarily assume the identity of the client so that it can evaluate a request for access relative to that client's rights. Then the server reverts to its own identity. NT's usual polymorphism fails here, so there is a pair of Impersonate/RevertToSelf routines for each flavour of IPC: named pipes, RPC and DDE.

Tools of the networking trade

NT bundles the client and server capabilities of a LAN Manager peer server running on OS/2. An NT server can share files and printers with NT, LAN Manager 2.x or other SMB/NetBIOS clients. Conversely, an NT server can use remote files and printers shared by NT, LAN Manager 2.x, or other SMB/NetBIOS servers. NT also inherits mail slots and named pipes from OS/2 LAN Manager. Mail slots are unidirectional and named pipes are bidirectional. Because both use the file-system API, they can ride on top of the file-system redirector and operate remotely (NT's asynchronous communication APIs can operate remotely for the same reason).

Like LAN Manager 2.1, NT uses TCP/IP or NetBEUI transports interchangeably, includes Unix tools (such as **ping** and **telnet**) and the standard MS-Net commands, and provides a Berkeley-style **sockets** library. Extended to support asynchronous I/O and the Windows programming model, the **sockets** implementation embodies the Windows Sockets specification recently completed by Sun Microsystems, FTP Software and other TCP/IP vendors. LAN Manager 2.1 features only available in the NT version of LAN Manager will include domain (multiserver) administration, true fault tolerance, Mac services and remote access.

NT also includes an RPC toolkit that conforms to the RPC protocol of OSF's (Open Software Foundation) DCE (Distributed Computing Environment). NT-based RPC clients will interoperate with DCE-compliant Unix-based RPC servers and vice versa. Client-side versions of the toolkit will also be available for DOS and Windows. There's one nifty extension to the DCE model: on NT, an RPC server will automatically spin off a thread for each caller.

The toolkit supports various transports: named pipes, NetBIOS, TCP/IP and NT's own internal LPC. The LPC option means developers can structure their standalone programs as collections of communicating parts and switch to a network transport to run the programs in distributed mode.

Although NT developers will face a bewildering array of network transports and IPC mechanisms, RPC is clearly the strategic choice. To drive the point home, Microsoft has used RPCs to enable many of NT's utilities to operate remotely. Print Manager, for example, handles true remote printing. There's no need to install printer drivers locally because you can execute a print job on a remote machine using its printer driver. You can point NT's performance monitor, process viewer and event-log viewer at your own machine or a remote machine to which you have access.

The tool that views and edits the NT registry will work the same way. The registry, introduced with Windows 3.1, expands in NT to include configuration data for all devices, users, applications and the system itself. Its CONFIG.SYS, AUTOEXEC.BAT and .INI files, as well as a whole lot more, are rolled into one database. RPC-enabled remote access to the registry will be a huge win for those who manage and support NT installations. Each key in the registry carries an access control list, so RPC-enabled remote access need not compromise security. Finally, Microsoft claims that the interface definition language of the RPC toolkit will be the same as that used to define object interfaces in the Cairo environment.

Although NT developers will face a bewildering array of network transports and IPC mechanisms, RPC is clearly the strategic choice.

Novell is working on an IPX/SPX stack and NetWare client for NT, and Microsoft hopes to bundle these components. As with the NetWare connectivity feature of LAN Manager 2.1, you'll still be running dual shells. But NT will integrate NetWare (and other service providers) more smoothly. It extends the Windows 3.1 network APIs for browsing and connecting to remote resources and provides an umbrella interface called the multiprovider router, which unifies the presentation of native and third-party services.

Win32 and Win32s

From the perspective of Windows 3.x, Win32 giveth and taketh away. It extends the Windows 3.x API set to support NT's memory management, multithreading, IPC, network and security features. It also beefs up Windows' file I/O, communications and graphics APIs; adds powerful support for exception handling, debugging and event logging; and provides a console API for building character-mode applications. At the same time, Win32 jettisons those parts of the Windows 3.x API specific to DOS or to 80x86 processors.

The file I/O routines plug a gaping hole in Windows 3.x and eliminate a major source of DOS dependency in Windows code. A nice feature of file I/O in NT is that all read and write operations are potentially asynchronous. Because the file-oriented functions also work with communications ports, named pipes and mail slots — all of which can be redirected over a network — asynchronous I/O is widely applicable. New graphics routines support paths (that is, collections of lines and curves); Bézier curves; and 2-D transforms used to rotate, reflect or shear images.

Exception handling is another of those features that's as useful to NT itself as it is to user programs. The kernel, for example, guards the execution of every thread with a handler that guarantees the same exit path in the event of normal or abnormal termination. A Win32 application can similarly protect any block of code with a **try** clause followed by either an **except** clause (exception handler) or a **finally** clause (termination handler).

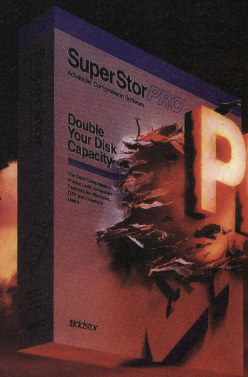
Although this **try-except-finally** syntax is specific to the 32-bit Microsoft C Compiler 7.0 in the NT Software Development Kit, the underlying support is woven into NT and can be manifested in any language environment. The mechanism is a powerful tool for controlling the complexity of applications and improving their reliability. If an application's exception handlers exploit NT's event logger, the information fed into the logs will simplify remote product support.

To help bolster the market for NT, Microsoft plans to support a restricted set of NT applications on Windows 3.1 by way of a Windows extender called Win32s. If you write an NT program that calls only standard Windows 3.x APIs, you'll have written a Win32s program. The.NT binary code (if compiled for 80x86) will run under Windows 3.1 using the VxD and DLL support of Win32s. Conversely, a Win32s program developed on DOS/Windows is an 80x86 NT binary code.

Win32s enables developers to begin targeting NT while preserving Windows 3.x compatibility. Although the NT 32-bit flat-

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memory model is available to Win32s applications, the 16-bit limitations of the underlying Windows 3.x engine (for example, 32K edit controls) still apply. Moreover, Win32s applications won't interoperate with 16-bit DLLs, and vice versa, a restriction that does not apply to Windows extenders available from Watcom and Rational.

Even though Microsoft has claimed that Win32s will stretch the Windows 3.x API to include Win32 enhancements not specifically ruled out by the limitations of DOS and Windows, details remain cloudy. Microsoft continues to insist that a forthcoming multithreaded MS-DOS 6 will support a full-featured Win32, constituting a true 'NT Lite' for low-end hardware.

In the short run, developers will have to choose whether to target NT, DOS/Windows, or both. Because Win32s will accept the full Win32 API (returning errors for unsupported calls), it's possible — although inconvenient — to build split-personality programs that exploit advanced Win32 functions on NT but can live without them on DOS.

Running DOS and 16-bit Windows software

DOS and 16-bit Windows programs run on 80x86 and R4000 versions of NT. Both platforms use the same DOS emulation layer made from the DOS 5 source code (minus its file system, which isn't needed). That layer talks to an IEU (instruction execution unit). On 80x86 hardware, the IEU takes the form of a virtual 8086-mode monitor that traps I/O and sensitive instructions. On the R4000, the IEU is a version of Insignia Solutions' SoftPC, a 286 emulator. The IEU simulates hardware and software interrupts, manipulates registers, and dispatches the VDDs (virtual device drivers) that emulate standard AT motherboard devices. The VDDs run in user space, where they can't affect NT's integrity.

The DOS emulator loads TSR programs low or high, provides XMS (Extended Memory Specification) and DPMI (DOS Protected Mode Interface) memory, presents text in a window or full-screen, and supports Clipboard cut and paste. DOS Programs see the underlying NT file systems and can call the named pipe and mail slot network APIs. NT multitasks DOS sessions pre-emptively and performs idle detection.

One or more Win16 programs multitask co-operatively in one DOS session. Calls to the Windows API 'thunk' (widen function-call parameters from 16 to 32-bits) directly through to their Win32 counterparts. Lacking a 32-bit Windows layer, OS/2 must rely on its DOS emulator to support Windows. Even on the R4000, NT can run Win16 programs handily.

A Windows application may spend 60 per cent of its time executing Windows code. Therefore, while a Win16 program might spend 40 per cent of its time slogging through the Insignia emulator, the balance will be spent running as fast as a Win32 program.

Because the Win16 and Win32 APIs are compatible, Clipboard, DDE and OLE exchanges across the thunk boundary present no problems. The integration is seamless; when you run a Windows program on NT, you can't tell whether its mode is Win16 or Win32.

OS/2 2.0's support for DOS device drivers is something NT doesn't even attempt. Microsoft's justification is that allowing the DOS subsystem direct access to hardware would violate NT's security and reliability. Ceding this territory to OS/2 is a slight gamble. But if NT attracts sufficient native driver support, it will pay off.

The crystal ball

The NT development team missed the target date for a feature-complete beta release by just three months. That release, widely distributed as of the July developers' conference, worked so well that some tool vendors are already shipping commercial products to other NT software developers — pretty impressive for a from-scratch effort amounting to over three million lines of C and C++. "And that doesn't include comments and white space," quips senior engineer Darryl Havens. "We only count the semicolons."

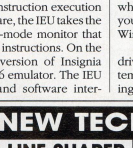
Not all the pieces have fallen into place. Although Microsoft will be licensing Silicon Graphics' 3D GL graphics library, it's unclear how that will tie into Win32. For now, Win32 inherits the Windows 3.x graphics model with its 2-D raster orientation. Win32 also inherits the underpowered DOS batch language. Object-based scripting is on the horizon for Windows in the form of OLE 2.0, but that won't appear in time for the first release of NT.

It's clear, though, that NT is built to undertake the distance. Workgroup-capable right out of the box and outfitted with tools geared for building distributed software, it will represent a challenge to NetWare as much as to Unix and OS/2. And in view of the relentless pace of hardware innovation, next year's multiprocessing, drive-array-equipped server will land on your desktop the year after that. When that dream machine shows up, NT will know what to do with it.

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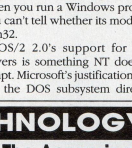
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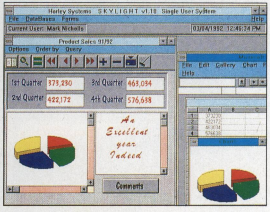
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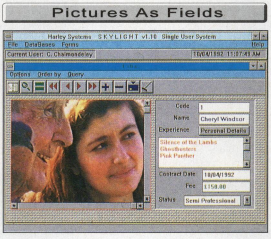
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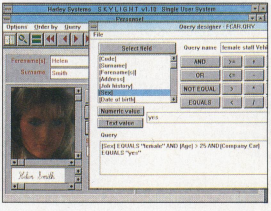
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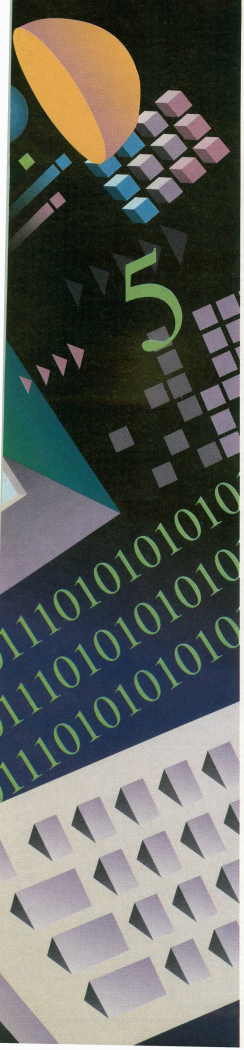
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OS/2 at the crossroads

BY MARK MINASI

IBM's desktop operating system has all the tools, but it needs some direction.

Since its introduction in 1987, OS/2 has garnered more than its fair share of both praise and scorn, and has been the hope and death of a few software companies. For all that, OS/2 still hasn't found its niche. But IBM believes in OS/2 – should you?

From a technical standpoint, there's a lot to be said for OS/2, and in particular OS/2 2.0. It's a 386-based protected-mode architecture that works well on basically the same computers that perform a good job running Windows 3.1: 386-based machines running at 25MHz and higher, with 8M or more of RAM. The OS/2 difference is its robustness.

I'm writing this article with the OS/2 System Editor, the OS/2 version of Windows Notepad. I'm also running the Windows Clock program in a window of its own. At the same time, I'm watching the computer play Chess against itself, and I'm monitoring the system with Pulse. Chess in one of the free programs that comes with OS/2, and it doesn't play a bad game at that. However, my main interest in Chess is as a CPU overloader. You can make the computer play both white and black, as well as set the player strength level anywhere from pushover to expert. Set white and black to the expert level, and you've got a pretty busy computer.

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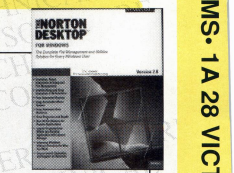
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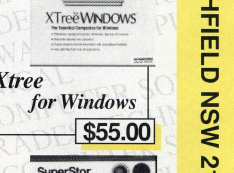
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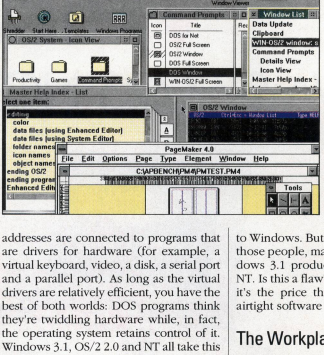
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That brings me to Pulse, another free goody that comes with OS/2. Pulse is a CPU-utilisation profiler, and I mention it as an example of how OS/2's underlying framework is superior to that of Windows 3.1. There really is no way to write a CPU-utilisation profiler for Windows because it uses a co-operative multitasking structure. If you're running five Windows programs, and one program wants to hog all the CPU time, there's nothing that the other programs — or Windows itself — can do about it. With OS/2, all the programs that demand the CPU's attention are forced to wait in line. I see an occasional delay in getting my text onto the screen, but it's almost imperceptible.



OS/2 2.0's Workplace Shell GUI is a model of consistency. Many OS/2 features, such as Print Viewer, take advantage of the Workplace Shell's object-based paradigm to deliver improved productivity

Protected, but not bulletproof

OS/2 makes good use of the protected modes of the 386 family, the protected mode of the 32-bit 386, and the mode of the Virtual 8086 that makes DOS multitasking possible. In general, it's impossible for one program to make another program crash, or to crash the operating system. It's easy for a buggy program to crash itself, but no operating system can address that problem unless the protected mode is extended to protect software from programmers.

Although robust, OS/2 is not bulletproof. It uses the protected mode to protect one program from another, but it shares memory usage among programs that utilise the GUI support provided by the GPI (Graphics Programming Interface). After a program returns from a GPI call, there's enough information left on the program's stack to allow the program (if written for evil, not good) to directly modify data structures in the GPI. This is unlikely, but it is a possibility — although an anomaly, given that operating systems seem to be evolving towards complete protection.

The fact that OS/2 isn't completely secure has its good points. At least for a while, the majority of the programs that run under OS/2 2.0 will be Windows and DOS programs, and there's something that OS/2 can do for those programs that even Microsoft's heavy hitter, Windows NT, can't do. Most DOS programs directly address the PC hardware either through memory addresses or I/O addresses. Protected mode means protection for the I/O addresses, so any PC operating system that wants to exploit protection and still support DOS programs must make a tough decision: how to allow DOS programs to continue to directly address hardware.

The most common approach — and one that makes about 70 per cent of the DOS programs happy — is to create a virtual PC, complete with virtual I/O addresses. The addresses are connected to programs that are drivers for hardware (for example, a virtual keyboard, video, a disk, a serial port and a parallel port). As long as the virtual drivers are relatively efficient, you have the best of both worlds: DOS programs think they're twiddling hardware while, in fact, the operating system retains control of it. Windows 3.1, OS/2 2.0 and NT all take this route.

But what about the non-standard hardware that's becoming standard, such as fax boards, tape drives and CD-ROM drives, as well as the smaller but important niche markets that include 16-port RS-232 boards and data-acquisition boards? IBM has learned from the compatibility problems of OS/2 1.3 and now allows DOS device drivers to virtualise in a DOS session — quite a neat answer. Windows 3.1 allows a DOS program to directly modify any hardware that's not on Windows' 'do not touch' list, which is one reason why it has been easy for purveyors of niche hardware to adapt their products to Windows. But NT offers no solution for those people, making their DOS and Windows 3.1 products unable to run under NT. Is this a flaw? To some, yes; to others, it's the price that must be paid for an airtight software platform.

Key features

- Workplace Shell GUI
- Pre-emptive multitasking
- Multithreaded
- 32-bit virtual memory
- DLLs
- Named pipes and mail slots

Future enhancements

- Windows 3.1 support
- 32-bit imaging model

Drawbacks

- Lack of user/developer acceptance
- Non-bulletproof protected mode
- Inadequate device support out of the box

The Workplace Shell

A discussion of the state of OS/2 would not be complete without mentioning the WPS (Workplace Shell). I have never liked GUIs, but I'm finding this one easy to cope with (see the screen, above).

WPS looks like it was designed by one person rather than a committee: it has a consistent thread running through the way it operates. I've often been surprised by the kinds of things on the WPS screen that support the shell's object-based paradigm. Even things like the Print Viewer are examples of how much an object-based way of looking at things can make a user interface a productive tool.

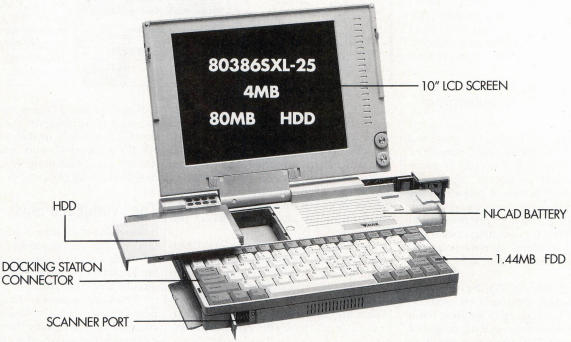
Market talk

Technological issues aside, how's OS/2 doing? In a word, badly. IBM claims that it has shipped 700,000 copies since the March release. With 110 million PCs out there, that means a market share measured in tenths of a per cent. Worse yet, there are relatively few people writing code for OS/2.

There is, however, a small but significant part of the computing market that is quite happy with OS/2: the COBOL crowd that wants to save a few cycles on their mainframes. I carry out a lot of work for companies with large-scale processing systems written in COBOL that have been on mainframes for years. These companies are not downsizing in the usual sense because they are happy with their mainframes. Instead, they are carrying out their initial coding and testing on OS/2-based computers running Micro Focus

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COBOL with the Animator debugger (it's practically an industry standard). It's not a large market, but it's solid — at least for now.

Earlier, I compared some of OS/2's architecture with that of Windows 3.1, and 3.1 came off badly. However, all the good points that apply to OS/2 2.0's robustness also apply to NT. That's one of OS/2's bigger problems in market acceptance: it is caught up in a squeeze between Windows 3.1 and NT. Had IBM brought OS/2 2.0 to market in early 1990 — as it could have, albeit without Windows 3.0 support — I believe that it would have been able to gain a firm foothold on the high-end desktop market. Another example of the squeeze play can be seen in my earlier discussion of protection: Windows 3.1 has less protection than does OS/2 2.0, but NT has more of it.

Further down the road

In the near future, you will see several things pop up in OS/2. First, its GUI will get a much-needed shot in the arm from the Micrografx 32-bit engine, due out soon and perhaps available by the time you read this article. OS/2 will also support Windows 3.1 programs, something it cannot do now.

One thing that has not been widely publicised is where IBM plans to position OS/2 as a server platform. OS/2's main use as a server is under LAN Manager and its cousin, the IBM LAN Server. But Microsoft is moving towards NT as its platform for LAN Manager, and IBM seems to be more firmly in Novell's camp with each passing announcement. IBM should clarify this soon.

In the near future, you will see several things pop up in OS/2. First, its GUI will get a much-needed shot in the arm from the Micrografx 32-bit engine.

OS/2 needs better device support. While it needs a powerful computer to run on, OS/2 also needs one that is plain. I'm not confident of ever making my Ultrastor 22CA ESDI controller work under OS/2. In contrast, the pre-beta version of NT supports many Super VGA boards, SCSI devices and accelerators. If IBM really wants OS/2 to be a success, it must include in the bundle support for 20 of the most popular LAN adaptors, Super VGA boards, bus mastering SCSI and ESDI controllers, CD-ROMs, and tape drives.

OS/2 also needs a clear long-term commitment from IBM. With Taligent on the horizon, why develop for OS/2? Will OS/2 2.0 programs run under Taligent? Will they have to be compiled? Or won't there be any compatibility at all? All IBM will say is that "there will be a migration path." One developer asked me, "Does migration path mean that my application will go south when I try to run it on Taligent?"

In addition, OS/2 needs documentation. It ships out on a couple of dozen floppies, with a few short pamphlets describing the installation process. Once you have it up and running, an extensive Master Index provides you with all the help information. It's quite good, but the installation has to be daunting to someone accustomed to seeing manuals. In fact, that's a problem that I've heard many companies cite when considering whether or not to move to OS/2.

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The future of System 7.0

Apple's Mac operating system is its road to the PowerPC.

TOM THOMPSON

Apple will continue to expand the capabilities of its operating system to differentiate it from other GUI-based operating systems. New features will be oriented towards providing users with a complete but easy-to-use work solution (see the screen). Some features will be obvious modifications to the GUI itself, while others will lurk behind the screen, supplying crucial facilities, such as colour matching. Further, Apple plans to move the Mac OS to the PowerPC, the RISC processor developed by the Apple-IBM-Motorola alliance.

The Mac OS's modular design and its expandability (via software patches called extensions) will be used to add new features without jeopardising compatibility with the existing software base. Earlier examples of this abound: MultiFinder added co-operative multitasking retroactively to all existing Macs; 32-bit QuickDraw revamped the QuickDraw imaging engine for handling 24-bit colour; and QuickTime added time-based data manipulation required by multimedia to colour Macs. All these extensions added new capabilities without affecting the compatibility of most applications software.

System 7.0, Apple's latest operating system, consolidates many of the just-mentioned extensions (the exception is QuickTime, which arrived after System 7.0's release) while offering improvements such as a built-in file-search function, keyboard navigation, peer-to-peer file sharing and IAC (Interapplication Communication). It provides the new base on which Apple plans to build its future operating system enhancements. Because of this strategy, users clinging to System 6.0.x should plan to upgrade soon or be left behind.

The immediate future

Apple's System 7.1, due for release this month, will fix some bugs now found in System 7.0 and offer new features. There are some significant changes as well. First, System 7.1 will address global markets by using a 2-byte character-storage scheme. This provides system-level support for languages using large character sets, such as Kanji. Second, it can use either Type 1 PostScript or TrueType fonts onscreen and for printing. PostScript Level 2 printing support will be provided. Finally, this operating system will be a reference version: when Apple introduces a new computer, a 'personality' extension will patch System 7.1's structure to recognise and use the new hardware. This eliminates the proliferation of operating system revisions that occurred under System 6.0.x when a new Mac was introduced.

Key features

- Use of extensions to add features while maintaining compatibility with applications software
- Advanced colour capabilities
- Interapplication communication
- Peer-to-peer file sharing

Future enhancements

- Ability to handle large character sets
- PostScript Level 2 printing support
- Ability to use Type 1 PostScript and TrueType fonts for both printing and onscreen display
- AppleScript control language
- Open collaboration environment

Drawbacks

- Inconsistent co-operative multitasking

Apple will add other features and utilities incrementally through the extension mechanism to minimise compatibility problems. Announced new features include AppleScript, a control language similar to DOS batch commands or Unix shell scripts; a store-and-forward mechanism called the OCE (Open Collaboration Environment), which integrates mail, messaging and document validation; and QuickDraw GX, a new imaging engine.

A brief look at QuickDraw GX is instructive because it illustrates the tightrope Apple walks in providing new features without compromising compatibility. QuickDraw GX is an object-based imaging system (that is, it treats text, lines, polygons and bitmapped images as objects with specific characteristics), unlike QuickDraw's pen-oriented imaging system (where you draw a line by setting a pen's characteristics and then moving the pen to different screen co-ordinates). QuickDraw GX handles algorithmic fonts, and it also provides systemwide colour-matching support.

QuickDraw GX does not use QuickDraw's data structures or code, so it can coexist with QuickDraw in the same computer. This enables existing applications to run and allows application desig-

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ners to migrate their code to the new imaging architecture as necessary. This situation is identical to that of QuickTime, which doesn't interfere with the existing software because it bypasses QuickDraw completely.

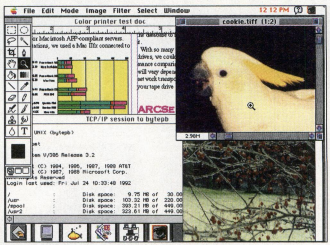
Kernels and RISC

Despite these improvements, System 7.0 still has fundamental design flaws. Cooperative multitasking works, but it's only as good as the worst-written application. It places the job of sharing processor time with other applications on the application designer, not on the operating system. The processor is still saddled with screen drawing and moving bytes to some peripherals. These are jobs better offloaded to coprocessors and DMA channels.

To make the migration of Mac software to a PowerPC-based Mac as painless as possible, Apple will implement a 680x0 object code emulator so it can run existing applications.

To achieve this end, Apple plans to revamp and consolidate hardware-specific functions into a microkernel, which will be the foundation for a pre-emptive time-sliced operating system, with memory protection, demand-paged memory and semaphores for task co-ordination. The kernel will be multithreaded to provide DMA and asynchronous I/O. Apple will make the kernel's size and hardware requirements lightweight so that it can run on as many Mac models as possible. A series of extensive patches and new system resources will be used to implement the microkernel on existing systems. The rest of the operating system and applications will lie atop the microkernel (see the figure).

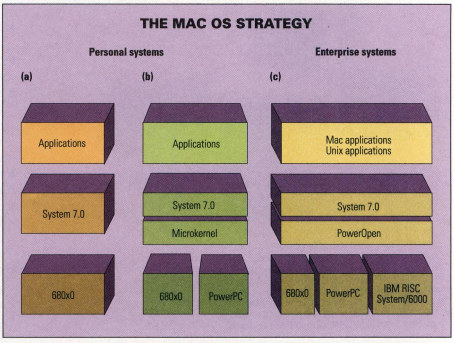
To make the migration of Mac software to a PowerPC-based Mac as painless as possible, Apple will implement a 680x0 object code emulator so it can run existing applications. Although emulation typically affects performance, it won't be as severe for Mac software. Apple has carried out extensive code profiling that indicates most Mac applications spend 66 per cent or more of their time in Mac Toolbox code. If the Mac Toolbox is implemented in RISC code, the application spends most of its execution time in high-speed native RISC code instead of in the slower emulator. The microkernel design will provide a consistent foundation for the operating system to use, in order to access hardware resources, regardless of the processor. Development tools such as RISC compilers and a 680x0 object binary translator from Echo Logic will be available to facilitate application ports to RISC code.



The Mac System 7.0 GUI is the interface that all others are measured against. As a totally integrated environment, it works seamlessly with the environment while providing a high degree of ease of use

This strategy means that users will not have to abandon their favourite 680x0 applications to use a PowerPC-based Mac. They can run them with reasonable performance by using the system's built-in emulator until applications written in RISC code become available.

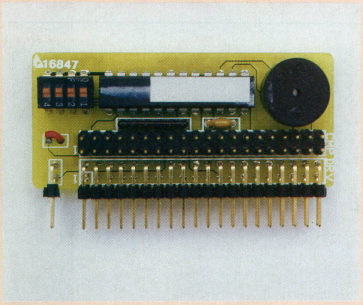
Finally, portions of the Mac OS and Mac applications are going to move to other platforms. For example, QuickTime is supported by Silicon Graphics' Unix workstations as a data standard, and a QuickTime player has been demonstrated running under Windows 3.0. Claris has ported its FileMaker Pro database application to Windows, and you can expect more applications to make the move in the near future.



(a) *The current Mac OS implementation.* **(b)** *In the future, a microkernel will supply hardware services using multithreaded code. On top of the kernel, System 7.0 provides operating system services, with the microkernel communicating to either a 680x0 CISC processor or a PowerPC RISC processor.* **(c)** *The PowerOpen architecture will provide hardware services for enterprise computing, which can use Mac and Unix applications, or the Taligent operating system*

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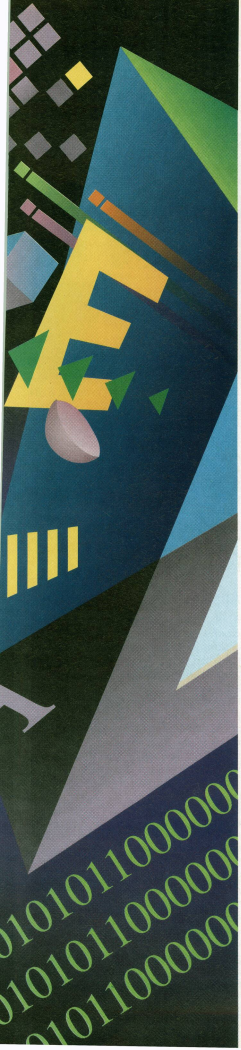
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GUIs, applications and Unix

BY MARK HUBLEY

A graphical interface and more powerful applications are the keys to Unix's success.

Unix vendors are shifting gears. Their operating system is maturing, and the market has become more competitive than ever before. Rather than obstructing each other in the name of dominance, the vendors are co-operating to make Unix a powerful force within the Intel-based desktop market. Without this co-operation, the traditional non-Unix desktop operating systems will continue to dominate. But if Unix vendors pull together, the desktop market will be the grand prize.

The race for the desktop market has forced rival Unix vendors to collaborate. Archenemics UI (Unix International) and OSF (Open Software Foundation), the two most influential Unix consortiums, are finally working together to form a united front. They perceive Microsoft NT and other desktop operating systems as a threat to Unix, competition powerful enough to eliminate individual Unix vendors from the desktop market. Their strategy is to stand as a united group of vendors, empowering them to successfully combat non-Unix desktop vendors.

Users view Windows and DOS as easy to implement because versions are identical between platforms. To ensure that all Unix versions are similar, all the vendors must implement standards such as Posix, ANSI, Motif and X/Open XPG. The goal is to make the differences among Unix versions indistinguishable to the end user.

Unix vendors are already working toward these goals. The most important accomplishment has been an industry consensus on a GUI: OSF/Motif. GUIs are critical because features such as desktop icons, drag-and-drop capabilities, and windows make Unix look like its competition. With GUIs, the complexities of Unix are masked. Further, a standardised GUI provides for the same interface regardless of the hardware platform being used.

OSF/Motif has been accepted by a majority of vendors as the standard Unix interface. With a standard GUI, Unix can compete in the ease-of-use category with other desktop operating systems. Motif allows you to do most of what command lines used to do, including sending mail, opening and manipulating files and applications, and even performing system administration functions. Motif runs on all Unix platforms, increasing its desirability in environments where there are computers from several vendors.

Applications compatibility

Applications compatibility among Unix versions also moves Unix closer to desktop acceptance. ABIs (application binary interfaces) allow Unix applications to run on different hardware platforms within an architecture without any recompiling or re-engineering. For example, in the Intel architecture, vendors make their binary implementation of Unix conform to the ABI specification. The applications written to the specification should be ABI compatible, allowing, for example, Lotus' shrink-wrapped software to run unchanged on Intel boxes from Unisys, NCR and Olivetti.

But ABIs are architecture dependent: if you want to run an application on Intel, SPARC or MIPS systems, the application must be re-engineered for each CPU. The good news is that Unix versions are similar, and minimal reworking is required — programmers should have to change applications only where there are hardware interfaces and operating-system extensions.

The SVID (System V Interface Definition) ensures that Unix implementations are binary compatible within an architecture, and it defines what an operating system has to look like (ie, what the interface calls should be) to be ABI compatible. Almost all Unix versions comply with the SVID, even those not in the System V camp. This includes the next version of OSF 1.1, which Hewlett-Packard, DEC and IBM are planning to implement. Most other Unix vendors already have SVID, many of whom base their operating systems on Unix System V Release 4.0, including NCR, Unisys, The Santa Cruz Operation, SunSoft and Olivetti.

Key features

- Consistent GUI across platforms
- Application compatibility across platforms
- Only operating system expandable to mainframes
- Built-in networking
- Large command set

Future enhancements

- Real-time services
- Desktop versions from key vendors, such as SunSoft
- Built-in GUIs
- Extra administrative tools

Drawbacks

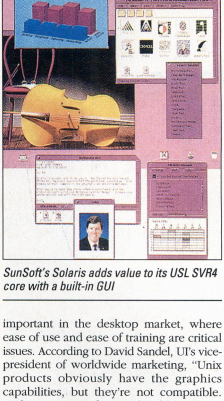
- Shortage of shrink-wrapped applications
- GUI-level incompatibilities among versions
- Negative market perceptions
- No easy way to run PC applications

Work continues: the future ABI

SVID is not the end; more work must be done on ABIs. The most pressing area of development is in value-added Unix, where vendors enhance their versions by adding extensions (eg, built-in GUIs, real-time facilities and extra administrative tools). However, value-added extensions affect compatibility.

For instance, Unix SVR4.2 is SVID-compatible with other SVR4 versions. But SVR4 is licensed to other vendors, which affects their compatibility. SunSoft's Solaris is an example of a value-added SVR4 because it has a built-in GUI (see the screen). Incompatibilities between SVR4.2 and Solaris exist on the GUI level, but the two operating systems are compatible beneath the interface. Thus, if you take away Solaris' GUI, you can still use SVR4 applications. Although SunSoft and Unix Systems Laboratories are devoting a great deal of time to the development of commonality between Solaris and SVR4.2, this problem signals a larger trend in Unix operating systems: value-added graphical operating systems (eg, Solaris) are here to stay.

GUI-based Unix systems are especially important in the desktop market, where ease of use and ease of training are critical issues. According to David Sandel, UI's vice-president of worldwide marketing, "Unix products obviously have the graphics capabilities, but they're not compatible. Without support for graphical-based systems in the [ABI] standard, we won't get enough shrink-wrapped software to compete on the desktop."



SunSoft's Solaris adds value to its USL SVR4 core with a built-in GUI

Applications software

Applications software is the real battleground. If Unix vendors want to devour desktop dollars, DOS and Windows applications had better be available for their systems. The desktop market demands PC applications. Even though there are thousands of scientific and commercial applications written for Unix, PC users want the applications they know best. Most people will not learn a new application or spend any money for training if the old application works just as well or better than the new one.

Popular applications in the PC world began working their way over to Unix a couple of years ago. Today, the most successful PC products are running on Unix, including Lotus 1-2-3, Microsoft Word and WordPerfect 5.0. However, only the best-known applications have a Unix equivalent. The majority of DOS applications are simply not available for Unix. Businesses depend on their critical applications; they cannot afford to change just because an operating system provides better programming, scalability or vendor independence. For those critical applications that are not available in Unix versions, many companies have explored the following alternatives.

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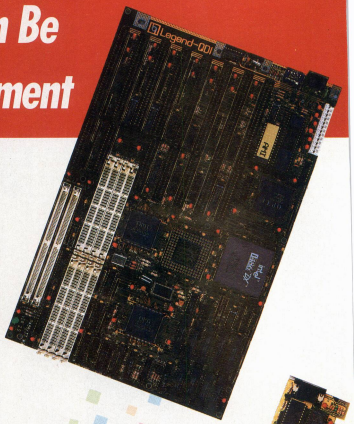
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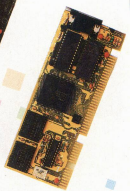
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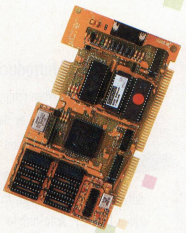
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nia Solutions, are probably the easiest solution. They simulate DOS on a Unix system. The downside to this technique, however, is that they make applications run as slowly as they would on a 286-based PC.

Plug-in boards that slide into a CPU slot, such as SunConnect's SunIPC, also allow Unix machines to run DOS. Unfortunately, they cost more than software emulators.

Virtual-mode simulators, such as Merge from Locus Computing and VP/ix from SunSoft, use the virtual 8086 mode of 386 and 486 processors to simulate PCs running DOS. Virtual-mode simulators allow several DOS applications to run simultaneously and let Unix run in a shell under DOS.

Porting is the most time-consuming solution. It requires extensive rewriting of an application, but the resulting software becomes truly Unix-based. Hunter Systems' XDOS has been used by many companies to assist in porting efforts, expanding such notable products to the Unix market as Borland's dBASE and XyQuest's XyWrite.

Networking offers another way to make DOS and Unix systems work together, and it allows an easy migration from DOS-only operations. Two methods are generally used: Unix file servers can be added to PC LANs, or PCs can be modified to communicate in Unix Ethernet networks. In the first method, Unix file servers can be accessed through LAN operating systems (eg, Novell's NetWare for Unix and Microsoft's LAN Manager for Unix). These operating systems provide DOS PC users access to Unix file-server facilities such as E-mail, file and resource sharing (eg, printers), and remote access. In the other method, Unix-based Ethernet networks afford PCs access to Unix networks without a server. Resources can be shared through TCP/IP and related software and Ethernet adaptor boards.

So, what's the future?

The biggest trend is GUI-based desktop Unix. SCO Open Desktop was the first in the field, and now others are following suit by converting their character-based Unix versions to graphical-based packages. In addition, as Motif becomes universally accepted, the number of applications that can run on Motif is growing rapidly.

Why should you buy Unix instead of Windows, OS/2, or other operating systems running on the desktop? Because it offers more flexibility: it's the only operating system that can be expanded to the mainframe. Networking capabilities are built in; and the command set is huge, allowing Unix to accomplish more complex tasks than its desktop counterparts. In addition, if you want to take advantage of the powerful RISC-based platforms, Unix offers you the widest choice.

Beyond technical advances, marketing is key to Unix's success on the desktop. It is up to the Unix vendors to drive the Unix market on the desktop. They must bring in independent software vendors, show them the growth potential of Unix, and assist in porting their software. The vendors must also educate end users about Unix's benefit and demonstrate its new ease of use and its complete compatibility among versions.

Price, ease of use, and a wider selection of applications has made DOS and Windows successful. Only by meeting the competition head-on will Unix triumph on the desktop.

NextStep: the sleeper

NeXT's object-oriented operating system now offers what others promise for later.

BY TOM YAGER

From anyone's perspective, NeXT has chosen an unusual tack. On the hardware side, NeXT has taken up Motorola CISC processors, such as the 680x0, at a time when traditional backers, such as Sun, are abandoning them. NeXT systems are inexpensive compared with other Unix workstations, but that has its price: these systems have almost no internal expansion capability (apart from memory and disk), and the only case opening in NeXT's fashionably black pizza box caters for a floppy drive. But you won't hear any NeXT users complaining; most of them are fanatically devoted to their systems.

The beauty of the NeXT is far more than skin deep. Its standard operating environment, NextStep, is probably the most respected piece of software on the planet. The reason it attracts so much attention is that, unlike almost every other popular operating system, NextStep doesn't shortchange anyone. Users, developers and integrators all reap the benefits of NextStep's object-oriented scheme. No-one who works with a NeXT machine feels like a second-class citizen. In contrast, the immensely popular Windows environment does not extend its benefits to developers, at least not if those developers use Microsoft's own C/C++ tools (which run under DOS).

That NextStep makes its users happy is obvious (see the screen over the page). A distinct departure from traditional Unix systems, everything on the NeXT is handled graphically, and the average user never deals with the operating system or even realises it's there. It retains the Mac-style global menu (a single menu bar that changes depending on which application has the focus), but on the NeXT, the menus are presented in movable vertical windows. Icons for commonly used applications are gathered along the edges of the display, and any running application displays an icon that you can double-click to instantly move its window to the top of the stack and make it the focus. The NeXT uses a Unix-style hierarchical file system, and a graphical browser is provided.

The combination of NextStep's interface features makes it, by far, the easiest Unix system to use. It reigns as the best example of Unix done right: it's aimed at ordinary users rather than traditional Unix users. As a result of all this, the NeXT is finding its way into domains that were once dominated by PCs and Macs.

NeXT's ease of use doesn't limit its functionality because networking and E-mail, distributed applications, integrated audio, network printing, and other desirable functions are all wrapped in point-and-click interfaces that make them accessible to every class of user. This is all standard with NextStep. While there are third-party enhancements for other systems

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that provide pieces of that functionality, NeXT is the only vendor bundling all of it with every system it sells.

Treated like an object

The underlying reason for NeXT's success is objects. Where traditional Unix treats everything as a file, NextStep understands and manages objects at an operating-system level.

The developers benefit from the system just as much as the users because the development environment for NextStep applications uses GUI power to make the process easier to manage. Blocks of code become objects that programmers can paste into other applications. Changes take place at the object level, and as long as the new object understands the same message set as the one recognised by the object before it, you are not required to chase around and change other modules. This modularity is not layered. Objects are an integral part of NextStep, and the object-oriented development environment is included with every system.

Thanks to NextStep, the NeXT has found its greatest appeal in the corporate community, where systems are configured for specific needs. NextStep makes customising a system easier than anything else I've seen. Applications become icons, and the development tools make it easy (and, I dare say, fun) to create customised graphical applications that, thanks to NextStep's standard object library, look and act as good as any commercial program. What might takes days of procedural programming to accomplish elsewhere can be reduced to a few hours of typing existing objects together under NextStep.

If your application is graphical or depends on high-quality text, you have the full power of Display PostScript at your disposal. And once you've invested that effort, you know that what you've built will run on any NeXT in (or out of) the house. The level of applications you can create in the standard environment is much higher on NeXT than anywhere else.

NeXT machines incorporate an ease of networking previously found only on the Mac. Every machine has Ethernet, and all it takes to get NeXTs talking to each other is to plug them into the same thin-wire or twisted-pair LAN. A new system will register itself at boot time with a designated configuration server. Without any further effort, the system immediately gains access to all public resources. This, too, is a boon for large installations, because it reduces system setup to finding desk space and outlets.

Key features

- Object-oriented
- Well-integrated GUI
- Integrated audio
- Easily networked
- Easily customised

Future enhancements

- Intel-based PC version
- NetWare and AppleShare client-network access
- Mac file-system support
- Distributed objects
- Database kit

Drawbacks

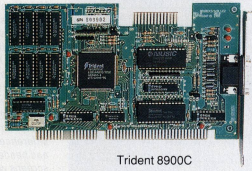
- Few shrink-wrapped applications
- Demanding software creates minor performance issues
- Completely proprietary (except for Display PostScript)
- No RISC platform support

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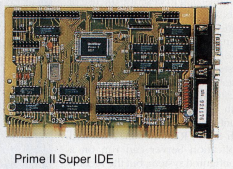
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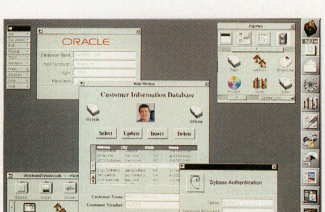
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The NextStep interface makes it the easiest-to-use Unix. It features icons for commonly used applications and a Mac-style global menu

benefits. But perhaps as early as the end of the year, NextStep 3.0 will be available for 486-based PCs.

Aside from the new platform support, NextStep 3.0 will also make NetWare and AppleShare client-network access standard. It also adds Mac file-system support, reading Mac floppy and hard disks and making them appear as NeXT file systems. A database kit will allow programmers to create object-oriented programs that transparently access popular networked databases. This new release also introduces distributed objects, extending NextStep's object messaging to allow objects to reside anywhere (for example, within the same application, on the same system, or across a LAN or wide-area network).

NeXT has the advantage of already being where most other workstation manufacturers would like to be. While everyone is reportedly making ease of use and developer support priorities now, NeXT had those primary goals from the start.

There isn't any high-performance machine that offers as many benefits for so little money and effort. As the application count rises (there are fewer than 300 applications for the NeXT, not counting the custom programs that NextStep supports so well), NextStep will doubtless be seen on many more desks.

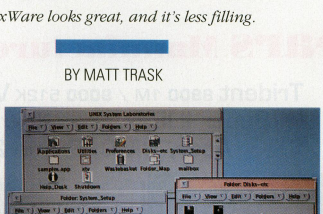
Univel's trim Unix

UnixWare looks great, and it's less filling.

BY MATT TRASK

In a time when downsizing has too many negative connotations, Univel, the joint venture of Novell and Unix Systems Laboratories, has used the term rightsizing to describe the use of its new UnixWare product as a solution for mission-critical applications.

UnixWare will be sold in two versions — a Personal Edition for single-user desktop systems and an Application Server for multiuser and network server use. The Personal Edition can run on a 16MHz 386SX system with 6M of RAM, but the recommended configuration is a 25MHz 386SX or higher with 8M of RAM and a 120M hard drive. Application Server can run on a similarly configured system, but the recommended environment is a 33MHz 486 with 12M of RAM and a 200M hard drive.



UnixWare's GUI offering is based on the X Window System and includes both the Open Look and Motif desktop managers. The screen here is actually USL's SVR4.2, on which UnixWare is based. Except for minor differences in the icons and header bars, the screens will be similar

Just the essentials for the desktop

UnixWare's main attraction is that it has been slimmed down significantly to operate on smaller desktop systems. How was such a feat accomplished? Several years back, a guru described Unix as "a small, fast, efficient, portable operating system, upon which every graduate student in the universe has played pin the tail on the donkey." A great deal of the difficulty and bloat associated with Unix was brought on by the inclusion of hundreds of utility programs, such as **tar, uucp** and **cpio.**

Univel has removed much of this extraneous functionality, and replaced it with



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an easy-to-use GUI and a set of system administration tools for tasks such as installation and backup. The GUI offering is based on X Window System 11 Release 5 and includes both the Open Look and Motif desktop managers (see page 196). Installation is claimed to be as simple as for Windows 3.1, and it can be performed from a CD-ROM or a network, as well as a disk or tapes.

Perhaps the most significant break with the past is the implementation of Novell's networking protocols directly into the Unix kernel. This will allow transparent interoperability with NetWare LANs, which are used in the corporate environment. The traditional Unix connectivities that are based on the NFS (Network File System) and TCP/IP networking protocols are available as an add-on package, and are still necessary for connecting UnixWare systems to the Internet and other Unix systems.

UnixWare Application Servers will not be able to run NLM (NetWare Loadable Module) applications, but developers can create new distributed server applications that take advantage of this environment. Univel claims that UnixWare is capable of running all the traditional Unix applications, as well as DOS and Windows programs, without any performance degradation.

The expected development tools, such as an ANSI C compiler and debugger, are available as an optional package. Other development kits provide support for NetWare programming, device driver development and GUI programming. A package called Moolit is available for GUI development with both Motif and Open Look. Programmers can also choose to develop command-line or full-screen-type applications.

Univel's use of the USL Unix System V Release 4.2 kernel provides significant security enhancements over older versions of Unix. The standard security level is certifiable at C2 and can optionally be tightened to B1 or B2. In contrast, DOS and Windows cannot be certified as secure, and Windows NT will be certifiable at the C2 level.

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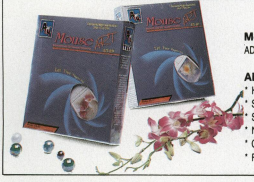
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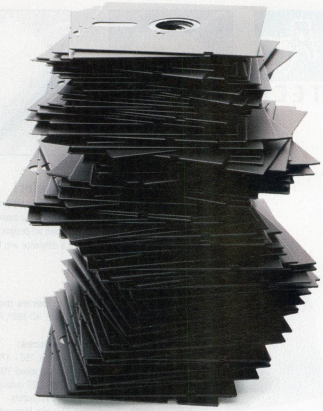
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Keep indispensable applications handy with TOTOP

Now you can float an application or icon on top of a full-screen application and keep the full-screen program active at the same time.

BY JOHN DEURBROUCK

If screen space is one of your scarcest system resources, you probably run your most frequently used Windows applications in full-screen mode. This lets you see more of what you're working on, but by hiding everything else, it costs you one of the major advantages of the Microsoft Windows environment.

TOTOP is a small (less than 9K) Windows 3.1 utility that lets you cheat a bit. With TOTOP, you can 'float' an application, or even an icon, above your currently active full-screen program. Just click on the TOTOP icon and select Top or Bottom, and you can float or sink any window with a click of the mouse — without deactivating the program window in which you're working. Since TOTOP uses features that are new in Windows 3.1, it can't be used with older Windows versions. It also requires a mouse.

The easiest way to get a copy of TOTOP is from our Mag-disk service. For Mag-disk contact details, see the text box 'How to obtain a copy of TOTOP' on page 205. The executable file is available as TOTOP.EXE and the C source code as part of TOTOP.ZIP, which also contains the .RC, .DEF, .ICO and .CUR files necessary to build TOTOP.EXE. TOTOP was compiled for distribution with the Windows 3.1 SDK and Microsoft's Quick C Version 1.0. The source can also be compiled, however, with Borland C++ Version 3.0, Turbo C++ for Windows Version 1.0, or Microsoft C Version 7.0. For further details, see the text box 'How to compile TOTOP'.

Using TOTOP

To take a quick look at TOTOP, simply pull down File menu in the Program Manager, select Run, and execute TOTOP.EXE from the command line. Subsequently, you'll probably want to add TOTOP to the Program Manager with File New, or even place it in your Startup group.

TOTOP makes no entries in either WIN.INI or any of your other files. Thus, if you later decide to remove the utility from your system, you need only delete any references to TOTOP in the Program Manager as well as the executable file TOTOP.EXE. Note, however, that you can't delete TOTOP.EXE while it's running, thanks to the protection Windows gives to executing programs.

When you run it, TOTOP only appears as an icon. You activate it by clicking once on the icon and then choosing an option from the system menu that pops up. Help provides a very abbreviated description of TOTOP, with quick-reminder directions for its use. The About choice provides the current TOTOP version number and displays TOTOP's copyright statement. Close deactivates the utility. The Top and Bottom choices perform TOTOP's real work.

When you select TOTOP's Top menu option, the mouse cursor changes to the form shown in Fig 1a. Whenever you move the mouse, TOTOP examines the window at which the cursor is pointing. If the mouse is pointing at the desktop or at a window that's already in the topmost layer, TOTOP changes its Top cursor to the No Top version shown in Fig 1b. The No Top cursor signifies that these windows cannot be floated.

Clicking the mouse when the Top cursor is displayed makes the application at which you are pointing float above the others. If you click when the No Top cursor is shown, TOTOP will simply release the cursor. Note in Fig 2 how the Notepad window remains visible over the full-screen Windows Write session even during menu interaction with the larger window.

TOTOP's Bottom menu option allows you to take any window out of the floating position, returning it to wherever it came from. When you select Bottom, the cursor takes the form shown in Fig 1c if you are pointing at the top-layer window. When you point at the desktop or a non-topmost window, the cursor changes to the No Bottom version shown if Fig 1d.

How to compile TOTOP

TOTOP is specific to Windows 3.1. Since topmost windows are new in this version, the Version 3.0 WINDOWS.H does not support the constants used to handle them. Therefore, you'll need at least a Version 3.1 WINDOWS.H file. Since all the functions called in TOTOP existed in Version 3.0, however, you can still use Version 3.0 import libraries.

You may be able to compile TOTOP by using a WINDOWS.H designed for Windows 3.0 if you #define the new constants. Here are illustrative definitions:

```
#define HWND_TOPMOST
((HWND)-1)
#define HWND_NOTOPMOST
((HWND)-2)
#define WS_EX_TOPMOST
0x00000008L
```

Although Windows 3.1's WINDOWS.H file allows you to produce Windows 3.0 programs by conditionally excluding the definition of some identifiers (using #define WINVER), it does not block the definition of either HWND_TOPMOST or HWND_NOTOPMOST. However, since I got UAEs regularly when I called SetWindowPos() with HWND_TOPMOST or HWND_NOTOPMOST, using these identifiers with Windows 3.0 is probably not a good idea.

TOTOP was designed, implemented and tested using Quick C for Windows 1.0, together with the Microsoft C/C++ 7.0 libraries and header files. I was also successful in creating TOTOP with Borland C++ 3.0 after I switched to the version of WINDOWS.H that comes with the Version 3.1 SDK.

Still, I did have to use the resource compiler version that came with the Borland product. The resource compiler that came with the SDK didn't work with the Borland compiler, but Borland's RC.EXE produced a TOTOP.EXE that worked fine.

Porting TOTOP to other C compilers that support Windows 3.1 should be very easy. There are no undocumented calls, and no use of Microsoft-specific C library functions or language features.

The steps for compiling TOTOP with several compilers follow.

If you are using Quick C for Windows

- Start Quick C for Windows and ensure that the Options Directories dialogue boxes include, and library paths point to, the Windows 3.1 SDK.
- Choose Project Open, select the directory containing your files, give the project a name (for example, TOTOP.MAK), click OK, and then answer Yes to create.
- In the Edit dialogue box, change file type to All Files (*.*); double-click on TOTOP.C, TOTOP.RC and TOTOP.DEF; and then click OK.
- Ensure that Options Project is set to Windows EXE. You can change other things, such as the memory model, optimisations, and so on.
- Choose Project Rebuild all. When the compile is completed, TOTOP.EXE is ready to go.

To compile using Microsoft C/C++ 7.0, the step-by-step procedure is

- Start PWB.
- Choose Project New Project, select the directory containing your files and name your project. For example, you'd use C:\MYTOP\-TOTOP to move it into the C:\MYTOP directory and call it TOTOP. Set the project template for C runtime support and Windows EXE. Then select OK to delete the New Project dialogue box.
- In the Edit Project box, double-click on TOTOP.C, TOTOP.RC and TOTOP.DEF, and then click on Save List.
- Select Project Rebuild all. When the compile is finished, TOTOP.EXE is ready to go. If you want to run it from PWB, don't forget to start WXServer from the Program Manager.

The following procedure is used to allow Turbo C++ for Windows (TCW) 1.0 to compile TOTOP.

- Open a DOS window and change into the directory where your files are stored. Enter this command line:

```
RC -r TOTOP.RC
```

This will create TOTOP.RES. Make sure you use the RC.EXE that came with TCW, not the new RC.EXE that comes with the Windows 3.1 SDK.

- Start TCW. This comes with Borland C++ 3.0 and is also available by itself.
- Choose Project Open project and the directory in which your files are stored, and type a project name (for example, TOTOP.PRJ). Then click OK.
- Choose Project Add. In the File Name box, type *.* and hit Enter, then double-click on TOTOP.C, TOTOP.RC and TOTOP.DEF. Then click the Done button.
- Click Options Application, and ensure that the current settings include linker output as Windows EXE and prologue/epilogue as Windows all functions exportable. Use any model (I used small) and then check that SS Equals DS (default for memory model). Click OK when these settings are correct.
- Select Compile Build all. You are not finished when the Compile Status box says Success, however. Click OK, than go back to your DOS box and enter this command line:

```
RC -t TOTOP.RES TOTOP.EXE
```

Now the program is ready to go, and it can be run from TCW by pressing Control-F9.

Finally, here's how to make TOTOP with Borland C++ 3.0:

- Start BC.
- Choose Project Open project, get your complete path and filename into the top line of the dialogue box (for example, C:\MYTOP\-TOTOP.PRJ) and then click OK.
- Select Project Add, enter *.* in the Name box, and hit Enter. Double-click on TOTOP.C, TOTOP.RC and TOTOP.DEF, then click Done.
- Under Options Application, select Windows App and hit OK.
- Select Compile Build all. When the compile is done, the program is ready to go. You cannot start TOTOP.EXE from BC, even if you're running BC in a window under Windows. Perform a Program Manager File Run, or run TDW to execute TOTOP.EXE.

John Deurbrouck

The best way to get a feel for how TOTOP affects your display is simply to experiment with it. You might decide to keep the Clock or Notepad floating above your active program as a matter of course. Obviously, however, if you float too many little windows, they may obscure your full-screen application so much that they become more annoying than helpful.

One warning is in order. Depending on the layout, a window you have floated may lie directly above the area where your application needs to bring up a dialogue box. In such a case, if you try to bring up the dialogue box, your efforts to interact with the application will only generate error beeps; the program requires a response to its covered-over dialogue box. The solution is to minimise or sink the obscuring window.

TOTOP's design

As soon as I started using Windows 3.1, I was so attracted by WinHelp's Always on Top option that I wanted to extend that capability to other windows as well. I soon realised that because all Windows programs use Windows' services to display themselves, it would not be difficult to use Windows itself to float any application.

I considered giving TOTOP a hotkey or designing it to inject an Always on Top option into each application's system menu. However, there were several advantages to keeping TOTOP unobtrusive and its design simple.

First, TOTOP does not use any undocumented features, so it's likely to work with future versions of Windows. Second, TOTOP does not impose a big drain on your system; at less than 9K, it's probably

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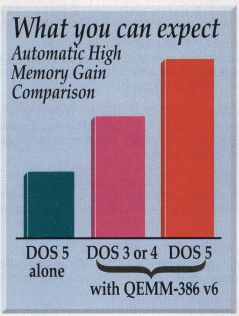


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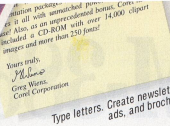
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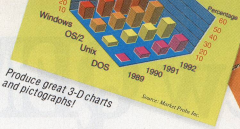
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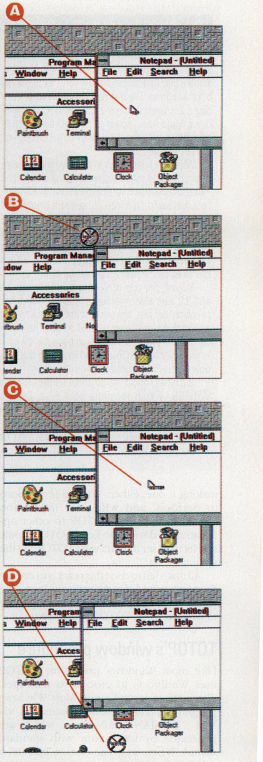


***Fig 1** When you select TOTOP's Top option, the pointer assumes the shape shown in **a** when positioned on a window that can be floated above your application, and it assumes the shape in **b** when on one that cannot be floated. Similarly, the Bottom option produces the cursor shown in **c** when positioned on a floating window that can be restored, and the shape shown in **d** when pointing at a window that TOTOP cannot sink further*

one of your smallest Windows utilities. And since it is completely dormant when not in use (it has no system hooks), it doesn't lower the performance of your applications. Finally, if you need to remove the utility — which is unlikely — it's easy to do. Erase TOTOP.EXE, and TOTOP is gone. There are no configuration files or entries in WIN.INI to delete.

Inside TOTOP

Since the C code for TOTOP is relatively short, I'm going to take advantage of this opportunity to go through the code for the main procedures step by step.

The first procedure is WinMain(). WinMain() makes sure the facilities that TOTOP needs to run are present. The first thing WinMain() checks is that no copy of TOTOP is already running. There would be no functional advantages to running multiple copies. The test involves simply checking the previous instance handle provided as a parameter to WinMain().

Next, WinMain() checks that TOTOP is operating under Windows 3.1 or later. It produces a UAE when run under Windows 3.0. WinMain() also tests for the presence of a pointing device by using

```
GetSystemMetrics
(SM_MOUSEPRESENT)
```

The SetCapture() function, used when the user clicks on the window to be floated, will lock up the user's system if no mouse is present.

The next step is to register the TOTOP class, with which TOTOP.ICO and WndProc() are associated. Then it's time to create and display the TOTOP icon by creating and showing a window. Note that TOTOP uses CreateWindowEx() instead of CreateWindow, so that it can use the Extended window WS_EX_TOPMOST.

Since TOTOP runs as an icon, it should align itself with the other Windows icons. Using the default position values in the call to CreateWindowEx() takes care of that.

The next step uses AppendMenu() to add options to the system menu. There's no reason TOTOP couldn't become a full-size application window, but there's no point in

The active app and the Z-order

Windows 1.x had only tiled windows. If you wanted one application to occupy most of the screen, you had to make room for it by shrinking other windows. The overlapping windows of Windows 2.x were a major improvement. The windows could now appear to be stacked on top of each other, with the active application always on top of the pile.

Windows keeps track of this layering by maintaining what is called a Z-order list. Just as X and Y set horizontal and vertical positions, the Z value for a window determines its apparent height; that is, its relative distance from the user. Each window has an associated Z value, and the window with the highest Z value is always unobscured. The next window is visible except where obscured by the first window, and so on.

Indeed, the pile of windows in Versions 2.x and 3.0 was always ordered with the active application on top, the next most recently used application right below it, and so on. There is a compelling logic to this design because the user is presumably most interested in seeing the window with which interaction is in progress.

But what should you do about utilities such as WINFSR, which monitors your Free System Resources? Even when you're using a full-screen application, you might want to monitor what percentage of your system resources you're using. Or if you operate WinWord as a full-screen application and need help to perform a function, you probably want to see the help while interacting with WinWord. To solve this problem, Microsoft added an Always on Top option for WinHelp in Windows 3.1. This lets WinHelp float above WinWord even when WinWord is running full-screen.

The Z-order itself remains unchanged, with the active application at the top of the Z-order. But applications can now project themselves above their positions in the Z-order. A window does this by telling Windows that it wants to be a topmost window. (For details, see the discussion of TopBottomWindowAtPoint() in the text.) Windows then uses the same Z-order it always used, but it projects topmost windows above the others. Since the Z-order is unchanged, a projected window positioned lower in the Z-order can entirely or partially obscure the active application at the top of the Z-order.

This design is simple and elegant, in that the basic handling of the display is unchanged. It can also be dangerous, however, because the window at the top of the Z-order (the active application) won't necessarily be a topmost window. If a projected topmost window obscures the application, you won't be able to see what you're working on! Still, topmost windows, used with restraint, can add a lot to the convenience of working with Windows.

John Deurbrouck

making it one, either. With so few actions to perform, and with user interaction limited to applying TOTOP to other applications, I decided to keep TOTOP iconic and let the user interact with TOTOP via the system menu.

All that's left to do at this point is to display the window and start the message loop. The rest of WinMain() consists of cleanup code to be used when TOTOP shuts down.

TOTOP's window procedure

Like most Windows programs, TOTOP uses WndProc() to process its messages. These are of several kinds. Most Windows programs receive menu commands via WM_COMMAND messages, which are generated by interaction with standard menus. When, as in the case of TOTOP, a Windows program receives messages from the system menu, menu selections from the user come as WM_SYSCOMMAND messages instead.

It's important to remember that the least significant four bits are undefined; that's the reason for the construct (wParam-&0xFFF0). Don't forget this when choosing command values for your own menu items; if IDM_TOP were 0xE010 and IDM_BOTTOM were 0xE011, you would not be able to distinguish them.

TOTOP also intercepts SC_MAXIMIZE, SC_RESTORE and SC_SIZE messages. If it didn't, the user could maximise TOTOP, making it a full-size window. Since this window doesn't even have a menu, you must prevent the user from restoring or maximising it. For the same reason, TOTOP intercepts WM_SIZE messages and eats SIZE_MAXIMIZED and SIZE_RESTORED messages.

TOTOP processes some of the mouse messages when Top or Bottom actions are being performed. These will be discussed in more detail later. The program responds to a WM_CLOSE message by destroying the main window and calling PostQuitMessage(). Finally, TOTOP calls DefWindowProc() either to process or squelch all the messages it doesn't handle itself.

TOTOP's options

The Help and About options are handled very simply by using the MessageBox() function to show a limited amount of information. With MessageBox() calls, you don't have to provide dialogue procedures, so they're much easier to use than dialogue boxes. Although not as attractive as dialogue boxes, they reduce code size and complexity.

The Close command will send a WM_SYSCOMMAND message with a wParam of SC_CLOSE. Since DefWindowProc() does just what is wanted, it is allowed to pass through untouched.

Floating or sinking the window selected by the user involves several steps. First, as soon as TOTOP receives the WM_SYSCOMMAND message of IDM_TOP or IDM_BOTTOM, it calls DoTopBottomAction().

DoTopBottomAction() loads the two appropriate cursors and then captures the mouse with SetCapture(). This allows the user to move the mouse cursor anywhere on the screen, with all the mouse messages being sent to WndProc(). The variable nDoingTopBottomAction has two uses. First, when TOTOP is not active, it is 0, which means that mouse messages should be passed through to DefWindowProc(). Second, its value, when non-zero, is either DO_TOP or DO_BOTTOM, which will be used in both IsDoable() and TopBottomWindowAtPoint().

DoTopBottomAction() also saves the handle to the original cursor in hcOldCursor. This enables redisplay of that cursor when TOTOP becomes inactive. Since TOTOP may or may not be successful in loading the appropriate cursors from its resources, nDestroyOkCursor and nDestroyNotOkCursor are used to determine whether it will be necessary later to call DestroyCursor() for each cursor. Of course, you don't expect that in the normal course of events TOTOP will ever fail to load its cursors. But since calling functions such as SetCursor() with valid handles has never been a good idea, I'm not inclined to break the habit of handling this potential error.

It would have been faster to load all four possible cursors while TOTOP itself was loading. Since Top or Bottom actions always take place after a user menu choice, however, it seemed better to reduce the drain on system resources than to save the small amount of time needed to load the cursor each time.

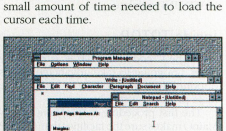


***Fig 2** A window floated by TOTOP (here, Notepad over Windows Write) remains floating even when the underlying active application calls up a dialogue box*

DoTopBottomAction() sets three more global variables. The first is nShowingOkCursor, which will be used later when processing WM_MOUSEMOVE messages. A non-zero value for nShowingOkCursor simply means that TOTOP is displaying the cursor that tells the user the desired action is possible at the current cursor location. The second is nGotLButtonDown, which TOTOP uses when processing the WM_LBUTTONUP message. Its zero value means that TOTOP has not yet received the WM_LBUTTONDOWN message and therefore should not act on a WM_LBUTTONUP.

The third variable is nSuccess. When TOTOP releases the mouse and becomes dormant, it does a MessageBeep() if nSuccess is zero. This feedback tells the user whether a window was successfully floated or sunk. The nSuccess variable is made non-zero in TopBottomWindowAtPoint().

When nDoingTopBottomAction is non-zero, TOTOP actually processes all mouse messages. Any mouse button manipulation except WM_LBUTTONDOWN and WM_LBUTTONUP result in cancelling TOTOP's operation by calling StopDoingTopBottomAction. This function sets nDoingTopBottomAction to zero, restores the original cursor, destroys any cursors that were loaded, calls ReleaseCapture() and carries out a MessageBeep() if nSuccess is 0.

While TOTOP is active, the mouse cursor must clearly indicate whether the mouse is pointing at a window that can be floated or sunk. This is achieved by processing WM_MOUSEMOVE messages. A call to GetMessagePos() retrieves the mouse cursor's position. The IsDoable() function tells TOTOP whether the desired action is permissable at the current position. If another cursor must be displayed, TOTOP switches cursors and updates nShowingOkCursor.

Two vital functions

The IsDoable() function is designed to return a window handle for a given point onscreen if the window in question can be processed in accordance with the value of nDoingTopBottomAction. Thus, for example, if the cursor is over the desktop, IsDoable() returns NULL. If the cursor is over a topmost window, IsDoable() returns the window handle only if nDoingTopBottomAction is DO_BOTTOM. When the window is not a topmost window, IsDoable() returns the window handle only if the nDoingTopBottomAction is DO_TOP.

IsDoable() looks first at nDoingTopBottomAction. If that is 0, IsDoable() returns NULL. Then the variable desktop receives the result from GetDesktopWindow(). Next, WindowFromPoint() gets the window handle associated with the pixel the mouse cursor indicates.

If WindowFromPoint() returns 0, or if the point is on the desktop, TOTOP returns NULL. It certainly wouldn't do to make the desktop a topmost window!

Remember, however, that the window handle returned has not yet been identified as the exact window to be checked and ultimately floated or sunk. That's because many applications display windows that have other windows embedded in them. Most controls, for example, are actually independent windows. It would hardly be enough to float the window of an OK button or a scroll bar peeking through a non-topmost application. The handle that is needed is that of the parent of such a window. The parent window should be the target unless, of course, the window has no parent or its parent is the desktop. Therefore, IsDoable() follows the chain to its origin, stopping when there is no parent or the parent is the desktop.

At this point, the variable child is the handle of TOTOP's targeted application. GetWindowLong() is called with the parameter GWL_EXSTYLE to receive the extended style for the target window. If the WS_EX_TOPMOST bit comes back set, the window is already a topmost window. If the bit is not set, the window is not in the topmost layer. Therefore, if the bit is set and nDoingTopBottomAction is DO_BOTTOM, the window can be sunk, so TOTOP returns the window handle it has obtained. If the bit is not set and DO_TOP is the desired action, again TOTOP can return the window handle. Otherwise, the desired action cannot be performed, so the return is NULL.

The TopBottomWindowAtPoint() function just adds or eliminates the targeted window's topmost attribute. (The way in which Microsoft keeps track of the various window layers is discussed in the text box 'The active app and the Z-order' found on page?206) TopBottomWindowAtPoint() first uses IsDoable() to obtain the handle for the window to be sunk or floated. If the result is NULL, the function just returns. If not, nDoingTopBottomAction is used to choose between HWND_TOPMOST and HWND_NOTOPMOST for the call to SetWindowPos(). If SetWindowPos() is successful, nSuccess is set to 1, and TOTOP has accomplished its work.

In summary

The ability to float windows is a most convenient Windows enhancement. I hope that Microsoft obviates the need for TOTOP by adding an Always on Top option to the default system menu of every application. In the meantime, TOTOP — used sparingly — can make Windows a more productive environment for you.

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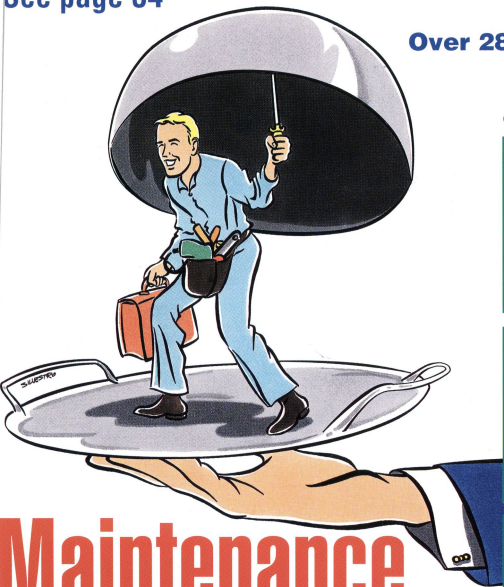
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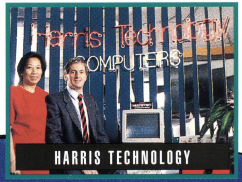
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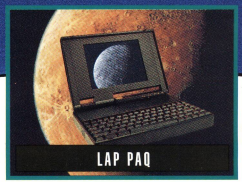
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Epoch LP486-50G, 8M, 212M	7449

Monitors

Acer 33D, 1024 x 768, 2.8	523
NEC 3FG 15in, 1024x768	Call
NEC 4FG 15in, 1024x768, NI	Call
NEC 5FG 17in, 1280x1024, NI	Call

Modems, Fax

Fax/Modems (ask for MAC versions)	$Price
Avtek Inplus 24, Int	289
Avtek Mega DataFax, Ext	300
Netcomm IN1500,MNP, Int	349
Netcomm Pocket Fax/Modem	349
Netcomm AM1500, MNP, Ext	321
Netcomm SmartModem/Fax M4F	778
Netcomm SmartModem/Fax M7F	1115

MODEMS (ask for MAC versions)

Avtek Mega+ 1234 MNP, Ext	395
Avtek Mega+ V32 MNP, Ext	698
Netcomm 1234E SM8500	499
Netcomm E4 1234, MNP, V42	590
Netcomm E7 V32, 123456SA, V42	958

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PC Super Market

NOVEMBER 1992

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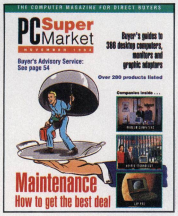
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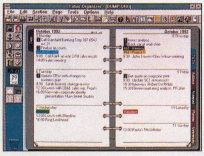
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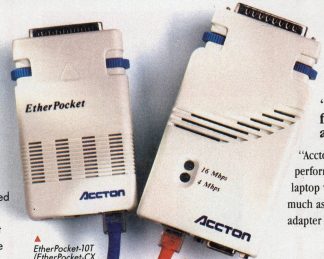


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PC MAGAZINE EDITORS' CHOICE
January 14, 1992
RingPocket 4/16

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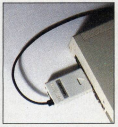
"Accton's EtherPocket (10BASE-T) performance on a Toshiba T1000LE laptop was about equal to and as much as 40% faster than Xircom's adapter . . ."

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LAN Magazine
March 1992



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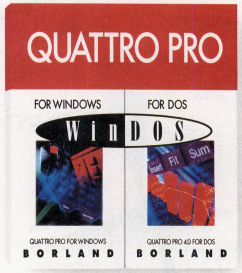
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Unisys engages competitive tactics

Unisys has lowered prices, released three new machines, and introduced telemarketing for boards and add-ons through Unisys Direct as part of a new PC strategy.

Prices have been reduced from between 35 and 62 per cent on the Personal Workstation2 line, including prices for storage devices, numeric coprocessors and printers. The three new machines are based on the Intel 50MHz 486DX, the 25MHz 486SX and the 25MHz 386SX processors.

Clear Technology, which sells Unisys' PC lines, claims that it is aiming to equate



list prices with street prices, providing a competitive base for valued-added solutions.

The 50MHz system includes six ISA expansion slots and lists for $3899, while the 486DX lists for $2330 and the 386SX for $999.

The new telemarketing strategy to be conducted through Unisys Direct — the company's telemarketing and direct-mail arm — will sell PC software, boards and peripherals.

According to managing director Dick Simpson, Unisys' new strategy is aimed at helping the company adapt to changes in the marketplace by reducing overheads, concentrating on value-added products and services, and streamlining ordering for customers.

For more information, contact Unisys on (02) 963 6000.

Jeremy White

TOP-SELLING SOFTWARE

THIS MONTH	LAST MONTH	MONTHS ON CHART	DOS BUSINESS APPLICATIONS	
1	13	15	Office for Windows	Microsoft
2	1	25	WordPerfect	WordPerfect
3	6	24	Excel for Windows	Microsoft
4	4	23	Work for Windows	Microsoft
5	5	23	1-2-3 DOS	Lotus
6	3	9	WordPerfect for Windows	WordPerfect
7	25	2	1-2-3 Windows/Ami Pro	Lotus
8	8	10	Work for Windows	Microsoft
9	9	25	Harvard Graphics	Software Publishing Corp
10	12	24	Works	Microsoft
11	11	22	CorelDraw!	Corel
12	7	9	WordPerfect DOS Additional Lic Pak	WordPerfect
13	17	21	Project for Windows	Microsoft
14	14	25	Q&A	Symantec Corp
15	2	2	WordPerfect Works	WordPerfect
16	15	15	FaceLift for WordPerfect	Bistream
17	20	5	Money for Windows	Microsoft
18	18	10	Publisher for Windows	Microsoft
19	–	1	CA-Textor	Computer Associates
20	16	8	Harvard Graphics Windows	Software Publishing Corp
21	29	4	Office for Windows Lic Pak	Microsoft
22	–	1	Harvard Draw	Software Publishing Corp
23	10	12	1-2-3 Windows	Lotus
24	–	18	Word for Windows Lic Pak	Microsoft
25	26	9	Excel for Windows Lic Pak	Microsoft
26	–	1	Accpac Simply Windows	Computer Associates
27	–	2	WordPerfect Wind Additional Lic Pak	WordPerfect
28	23	24	Word	Microsoft
29	21	24	First Choice	Spinnaker Software
30	27	4	SmartSuite	Lotus

Microsoft on the bulletin-board bandwagon

Microsoft is offering a free BBS to users of its products. An ancillary to its current customer-support services, the BBS features software revisions and updates, including printer and Windows drivers, and technical notes on using Microsoft products.

The BBS started operation on October 1 and is available 24 hours a day. It offers five dial-in lines at up to V.32bis MNP (8 data bits, no parity and 1 stop bit) and can be reached on (02) 870 2348. Registered identifications and passwords are not required, and access is read-only.

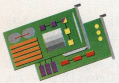
An increasing number of software vendors are providing similar support BBSs for their customers, and many also have support forums on information services such as CompuServe. Microsoft's introduction of a BBS coincides with an increase in its Communiqué subscription rates from $30 to $40 a year.

Jeremy White

A board user's manifesto

Do us a favour and make this stuff easier to install

By Chris Devoney



Some things in life should be simple, such as installing new peripherals or adaptors in a PC. But more commonly, this so-called 'child's play' turns into frustration.

Manufacturers produce just about any conceivable card for a one-hundred-million-strong PC market. Customers can acquire video adaptors, sound boards, GPIB instrument bus cards and SDLC adaptors. Consumers can purchase supercards with four serial ports, two parallel ports, one game port, four floppy drives and two IDE disk drives for $150. The only thing they can't buy is easy setup.

Supposedly, setup is a simple process. With the right tools and aids, getting a new card or device to work properly should indeed be child's play. Physically, installing an adaptor takes a maximum of 15 minutes. In too many cases, however, the rest of the day is spent pouring over manuals, or calling dealers, consultants or support departments.

Installation, like death, is easy. Configuration, like comedy, is a joke. The laugh comes from confronting three DIP switch blocks or six to 20 jumper pins. The guffaw is locating free upper-memory space for an onboard ROM, some spare CPU I/O ports, an unused interrupt request (IRQ) line, and a pristine direct memory access (DMA) channel.

The jest is deciphering manuals that are ambiguous or written like stereo instructions. The stunt is accepting software where its attitude towards testing boards or changing startup files is whimsical at best.

Even on virgin machines, experienced users can find the task daunting. As each slot fills, the chance for overlapping settings and conflict between boards grows. The result is confusion, frustration and lost productivity. By tying up a few hours of support desk or a consultant's time, a $250 bargain board becomes a $500 or $700 albatross.

We need adaptors where the setup is almost effortless. We need either boards that configure completely through software, or installation software that provides clear and definitive assistance.

Intel successfully pioneered soft-switches in early models of the Aboveboard, where changing settings was as simple as changing a few menu selections in the program. Unfortunately, EAROM and flash memory are expensive. When dollars count in a cost-competitive environment, either device busts the bank.

DIP switches and jumpers are easier to accept if the vendor includes the right installation software.

And if vendors want more sales, adaptors must be made more 'consumable'. A major key is keeping the installation process simple and sensible.

Six points of order

First, boards need to be designed to be flexible. Vendors shouldn't continue to force boards to work in fixed locations. Allow users to choose from three or more locations, DMA channels or IRQs. Use the additonal channels available on ISA or EISA machines.

Second, provide a pre-installed software program that examines the machine and gives any required switch settings. Clearly show all memory, IRQ, and DMA settings. When F1 is hit, give a clear explanation of the setting, not just how to operate the program.

Offer an option for a printed copy (what the otherwise flawless HP forgot on its ScanJet IIc installation).

Third, test the setup immediately after the card is mounted and at any time the user desires. Immediately eliminate the possibility of out-of-the-box mortality.

Also, recheck for address or port conflicts, and above all, test, test, test and then reassure.

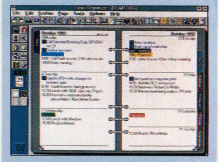
Fourth, give the user a choice on the source and destination for copying the software. Don't be capricious in changing CONFIG.SYS or AUTOEXEC.BAT.

Fifth, presume board settings will change as other boards are added. Copy the setup program to the hard disk. Let the user run it any time. Don't force the user to recopy all the software. Find and make the needed changes in the startup file.

Sixth, if you can't write your own software, license it or buy it from some-

Continued on page 9

Lotus Organises Australia



Lotus' Organizer 1.0 for Windows — an electronic diary, address book, planner and notepad

Lotus Organizer, now available in Australia, is a personal information manager for Windows that has the functions and feel of a traditional Filofax or DayTimer. The application works in exactly the same way as these physical organisers, with sections for To-Do notes, a Diary, Address Book, Planner and Notepad.

The program also features Lotus SmartIcons and a graphical Toolbar, allowing users to perform most functions with the mouse, including a facility for dragging and dropping notes and entries from one part of Organizer to another, or for inserting 'links' between different sections. An entry in the Diary, for example, can be linked to an entry in the Address Book. By clicking on an appointment, the Organizer will call up the Address Book entry for the person with which the appointment has been made, or notes on the subject of the appointment from your Notepad.

Organizer ties well into the Windows environment. You can even use it as a Windows shell to replace the Program Manager. DDE links can be established to word processors or other applications, and the program is also 'mail enabled', allowing you to call up Lotus' cc:Mail or Notes from within by simply clicking on the icon bar, or by dragging items to a mail icon to send them. Future releases will also support group calendaring and scheduling.

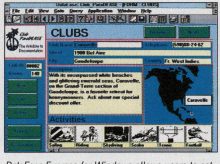
Organizer is available now for $245. Users of Threadz Organizer may upgrade for $95. Contact Lotus on (02) 287 1900.

Jeremy White

DataEase Express for Windows

DataEase has released a Windows version of its popular DataEase Express relational database. The new version features object-oriented presentation features, application stylesheets and the ability to run current DOS applications without conversion.

DataEase PRISM technology, which allows GUI and character-based applications to coexist and provides transparent access to multiple database engines, makes migration to Windows easy. Stylesheets allow developers to maintain a consistent



DataEase Express for Windows allows users to set up stylesheets for applications

look and feel across database applications, working in much the same way as the stylesheet facilities available for document creation in most word processors.

The released package includes built-in dBASE and Paradox ODBC drivers, and supports database engines such as Sybase, Microsoft and Novell SQL servers, Oracle, and many others via Dynamic Link Libraries (DLL). The list price for DataEase Express for Windows is $850, although a current special price of $530 is available until the end of December. Contact DataEase on (02) 876 6911.

DataEase will be expanding the products capabilities in the first quarter of 1993 by releasing Object DataEase Query Language (ODQL), an object-oriented, event-driven language for producing full-transaction and batch-processing procedures that maintains compatibility with text-based 4.53 DQL. The company also plans to release a Unix implementation under X Window, and Windows NT and OS/2 versions.

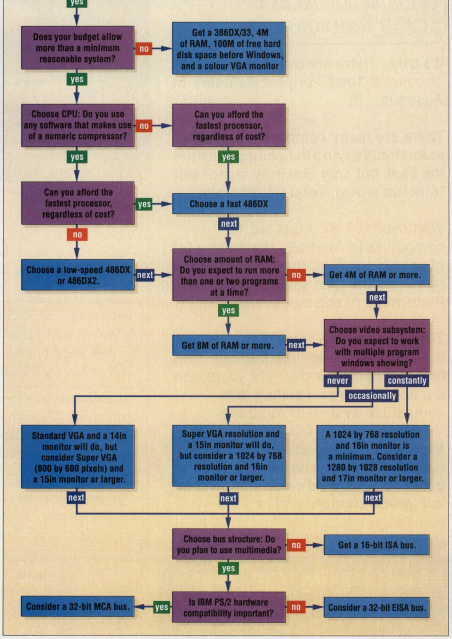
Jeremy White

(Continued from page 8)

one else. The only excuse for not having these features is blind arrogance.

Admittedly, flaws in ISA and EISA cause many installation blues, and complacency in VESA's VL-Bus isn't helping. IBM's Micro Channel solved some of these problems, but it received a cold shoulder from consumers. In addition, software doesn't show up on benchmarks.

However, give the consumer some credit. If you deliver easy installation, most intelligent consumers will pay a little extra for the convenience. It's up to vendors to provide the help. It's up to consumers to make intelligent choices.



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* ***3 Year Warranty includes Parts & Labour***

Options	
8MB RAM	add $300
245MB 10ms HDD	add $450
1.44Mb (3.5") FDD	add $120
Ms-DOS 5	add $ 99
Ms-Windows 3.1	add $ 99
TP-Mouse Kit	add $ 65
Please call for other options	



$3,250

If you require a written quotation or have in mind a network which requires a network schematic, we guarantee to provide not only a competitive quote but to do so with a quick response time.

Volume discounts are available as are special prices for charitable organisations.

Please refer to our advertisments towards the rear of this magazine for a sample of pricing and details on our extensive range of quality products.

30 Day Money Back Guarantee *

* Conditions apply

Buy and Try any TP computer system at your home or office. Put it through its paces. If it does not perform to your requirements you may return it for a refund.*

* Refund is subject to a deduction for any damage beyond fair wear & tear and at our discretion a 15% restocking fee.

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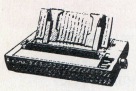
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PRINTERS

EPSON

LX-400	265
LX-850	331
FX-850	833
FX-1050	1021



LQ-100	**429**
LQ-200	474
LQ-570	**599**
LQ-870	1007
LQ-860+	1007
LQ-1070	848
LQ-1170	1295
LQ-1060+	1295
LQ2550	1758
DFX-5000	3735
DFX-8000	5616
SQ-870	$ Low
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EPL-4000 Top Laser!	**1690**
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EPL-8000	$ Low

PRINTERS

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LC10CL	379
LC200CL	Call
LC15	599
LC2420	485
LC2415	785
LC24200	549
LC24200CL	645
ZA200	860
ZA250	971
XB24200	1052
XB24250	1138
STAR LASER4C	2340
STAR LASER4 P/S PostScript 2Mb	2990
STAR LASER8IIIC	3527
STAR LASER8TC	4816

DOCKET PRINTERS

DP8340	370
SP300	658

FUJITSU

DL900	525
DL1100 Colour	599
DL3450	932
DL3600	1212
DL4600 COLOUR	2336
DL5800	2710



FUJITSU 600LPM BAND Printer	11186
FUJ 1200LPM BAND Printer	19652

HP PRINTERS

DESKJET 500	890
DESKJET 500C color	1690
HP LASERJET IIP+	1895

OKI PRINTER

ML172	320
ML182 TURBO	395
ML320 ELITE	675
ML321 ELITE	851
ML380	579
ML390 ELITE	829
ML390 FLAT BED	1470
ML391 ELITE	965
ML393B ELITE mono	1755
ML393C ELITE color	1875
OL400 4PPM LASER	1714
OL800 8PPM LASER	2160
OL830 P/Script Laser	3383

ACCESSORIES

IDE Cable	10
SCSI Cable	22
XT IDE Adaptor	49
XT/AT SCSI Adaptor XT/AT	Call



SCSI+FDC Adaptor	65

HARD DISKS

MAXTOR

MAXTOR CHEYNNE	
125MB 15ms IDE	**585**

Quantum

120MB 2.5"	962
120MB 2.5" PS/2 Kit	1404
120MB 2.5" SCSI	996
240MB LPS Passport Removable	1142
240MB	1752
240MB PS/2 1" Kit	1858
240MB SCSI 1"	1251
50MBRemovable	726
52MB IDE LPS	370
676MB SCSI 15ms	2592

Tape Back Up

Core

Light 250MB INTERNAL. AT	814
40MB INTERNAL PS2/50/60/80	828

Colorado Jumbo

120MB DJ-10 Int.	475
Jumbo 250MB DJ-10	526
QFA-700MB Internal	1548
QFA-700MB External	1908
QFA Tape Controller XT/AT/386	374
QFA Tape Controller PS/2	605

CD-ROM DRIVES

PANASONIC

CD-ROM Drive	**685**
Sony Laser Library	1348
Sony CD-ROM Int.	710
Sony CD-ROM Ext	952

OPTICAL DRIVES

IBM 127MB Rewritable Optical	2318
IBM 127MB Optical Disk(Media)	157
Sony Rewritable Internal Drive	5227
1GB Erasable Optical AT Drive	11448
650MB Erasable Optical AT Drive	8712
1GB Erasable Media	996
650MB Eras. Media	852



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Lantastic from Artisoft

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Simplicity 2 User Kit inc. Netware Lite, cables & cards	1279
Simplicity 1 User Kit	619
Pocket LAN Adaptor Thin Ethernet	634
Novell Netware Lite	119
Novell Netware 2.2 5 user	1080
Novell Netware 3.11 10 user	3110

UPS

Smart-UPS 400VA	936
PowerDoctor Software	150
UPS Monitor Board	216

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64K Cache 32Bit Slot

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256K Cache 32Bit Slot
Up to 32MB RAM On-Board

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1Mb 1024x768x256 249
Video7
1Mb VRAM II 625
Video7
SPEA Accelerator 3384
Graphics Vision 1024
Rendition II/256
VGA SUP 2314
Rendition III/256
2Mb VGA 4114
Trident SVGA 1Mb 199

MONITORS

SAMSUNG

14" P/W VGA 245
SyncMaster 3,
14" SVGA" 917
SyncMaster 5C
17" 1280x1024" 2360
Samsung 20"
Mono inc. card" 2123
AOC 14"Colour
SVGA Non-Int. 644
IDEK 21" Flat
Non-Int. Low Rad. 4716

WYSE

WY550 14" P/W VGA 287

WOW !!
Look at those
LOW Prices !!!



SOFTWARE

AMI Professional 2 509
Borland Sprint 252
DisplayWrite 5 592
Just Write 104
Lotus Manuscript 626
MS-Word /win 481
MS-Word OS/2 481
MS-Word 5.5 550
Multimate Adv. II 526
Professional Write + 282
Q&A Write 245
WordPerfect /win 540
WordPerfect 5.1 499
Wordstar /win 522
Wordstar 2000 474
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DATA BASE

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Data Perfect Call
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dbFast Call
FoxBase + 408
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Reflex 318
Superbase Call
Tracker Plus Call
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Geoworks Pro Call
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PFS First Choice 198
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Autodesk Animator Pro Call
CorelDraw 3
CD-ROM Included 599
Deluxe Paint II Enh. Call
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Quattro Pro 4 599
Supercalc 5.1 199

If the product you are looking for is not listed, please call our friendly salespeople.

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That mean Business

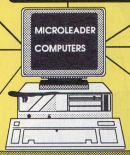
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The best IBM* Compatible computers, at the best possible prices in Australia. Full national support.
Call for pricing and configuration to suit your needs. **Service, advice and the right price. Full range of TP systems**
All systems come fully configured and set up. Make us your last stop. You will not be disappointed.

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SCHOOL | WORD PROCESSING

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Low competitive prices on all software purchased with a Computer system

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PE40 Supplier
PE50 Supplier
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Preffered Supplier
Over 100,000 users in australia

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2 MB RAM Upgrade only $150
For Large Quantities Call

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14"-21" SVGA Color Monitors
Call for best prices in Australia.

Maths Co-Processors
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Upgrade your XT/AT to the more powerfull **386-SX** with 1Mb RAM from only **$499**
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FDD & IDE Hard Disk Controller

Remember, Quality has it's own rewards

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The World's leading graphics software package.
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FOR WINDOWS
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SAVE $181

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FOR WINDOWS
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Hard Disk Maximizer
Increase your Hard Disk Space 2-3 times. Very Easy
Runs Dos 3.x, Windows3 etc.
Easy to install Ideal for laptops
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ALLOY
120/250Mb
Tape Back-Up Unit
Runs of your Floppy Controller
Very Easy to install
$599

MAESTRO MODEMS
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2400 ZXR (1234) Ext. $399
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Video Blaster

(From the creators of Sound Blaster)
Intergrates video and audio sources from videodiscs, VCR's and cameras and combines them with VGA Graphics. Digitizes, Overlays, Crops, Scales, Masks and Resizes. Add animation etc to Windows !!!

$699

Save $120

SOUND BLASTER Pro

$399

TOTAL PERIPHERALS

386-SX 25 Notebook

FREE! Carry Case.

True 386/32Bit Power to take anywhere.
4Mb RAM, 80Mb HD, VGA LCD, Battery
Ms-DOS V5, TP-Mouse & Windows 3.1 **$CALL**

New!

The most Amazing Deal in Multimedia History

$2590

Genesis II/MPC Multimedia PC

* **80386SX-33MHz CPU,**
* **2 MB RAM** (Expandable On-Board)
* **3.5"1.44MB Floppy Drive**
* **85 MB 17ms Hard Disk**
* **512K UltraVGA CARD 1024x768**
* **14" UltraVGA**
* **SuperVGA** COLOR Monitor 1024 x 768
* **2 Serial, 1 Parallel Port, 1 Joystick Port**

* ***12 months Warranty Parts & Labour***

Comes Standard With
High-performance Buffered CD-ROM Drive
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VIDEO Blaster *(optional)*
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or M/S M/Media Bookshelf
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Interstate orders welcome. Just send us your cheque with your order. Bankcard, MasterCard or Visa welcome
TRADING HOURS:
Monday-Thursday 9:00-7:00PM
Friday 9:00-9:00PM
Saturday 9:30-5PM

All prices include Sales Tax where applicable and may change due to factors beyond our control. *(E&O.E)*

Don't forget !

Every advertised product purchased from Microleader comes with a hefty discount. We don't charge unrealistic RRP prices unlike some competitors and we don't offer 'funny-money' towards your next purchase. We care about our customers and we will endeavour to beat any price found to be lower than our own, except when it means discounting the quality of our service.

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Price Watch

This month Price Watch features the number that seems to be on the lips of all the dealers advertising around town — 386/33s.

We've isolated 386/33 and 386SX/33 machines and offer a comparison chart based on a trade-off between features (hard disk capacity) and price. Note that many offer a base price with only 1M or RAM, and at the rrp of RAM, some of these 'bargains' require a second glance to make sure of what you're getting for the money! All attempts to compile a chart for colour notebooks were to no avail. Without fail the message we got on the streets was, save your money, the time is not right! (You heard it first here).

At the higher end we couldn't help noticing the number of reasonable deals on 486DX/50MHz machines, so there's also a chart comparing some of the better deals around.

All dealers were quizzed anonymously, of course, and asked about hard disk, RAM, floppy drive options, cache memory and Super VGA cards.

Gold stars for honest to goodness performance must be awarded to Alec from Futuretron in Melbourne and Nick Wiley from Harris Technology in Sydney. Both argured me down from the specifications the magazine had decided for Price Watch, and both offered good sound advice and a confident grasp of the subject and the marketplace.

386/33 PCs: summary of features

Dealer	Phone	Brand	Best price	HDD	RAM	FDD	Cache	SVGA	Extras
The Computer Shop	(03) 578 2477	IAC	$1879	105	2M	1.44 or 1.2	No	512K	None
Rod Irving	(03) 663 6151	Ritron	$1599	105	1M	1.44 or 1.2	64K	512K	DR DOS 6
Rod Irving	(03) 663 6151	Ritron	$1609	105	1M	1.44 or 1.2	128K	512K	DR DOS 6
Rod Irving	(03) 663 6151	Ritron	$1679	125	1M	1.44 or 1.2	64K	512K	DR DOS 6
Rod Irving	(03) 663 6151	Ritron	$1699	125	1M	1.44 or 1.2	128K	512K	DR DOS 6
Rod Irving	(03) 663 6151	Ritron	$2049	200	1M	1.44 or 1.2	64K	512K	DR DOS 6
Rod Irving	(03) 663 6151	Ritron	$2129	200	1M	1.44 or 1.2	128K	512K	DR DOS 6
Suit Electronics	(03) 486 1946	Suit Microsystems	$1300	42	1M	1.2	No	512K	None
Suit Electronics	(03) 486 1946	Suit Microsystems	$1385	85	1M	1.2	No	512K	None
Suit Electronics	(03) 486 1946	Suit Microsystems	$1420	100	1M	1.2	No	512K	None
Suit Electronics	(03) 486 1946	Suit Microsystems	$1450	120	1M	1.2	512K	None	
Super Personal Computers	(03) 543 3755	Super PC	$1395	42	1M	1.44 or 1.2	No	512K	None

386SX/33 PCs: summary of features

Dealer	Phone	Brand	Best price	HDD	RAM	FDD	Cache	SVGA	Extras
The Computer Shop	(03) 578 2477	IAC	$1689	105	2M	1.44 or 1.2	No	512K	None
Rod Irving	(03) 663 6151	Ritron	$1519	105	1M	1.44 or 1.2	No	512K	DR DOS 6
Rod Irving	(03) 663 6151	Ritron	$1599	125	1M	1.44 or 1.2	No	512K	DR DOS 6
Rod Irving	(03) 663 6151	Ritron	$1949	200	1M	1.44 or 1.2	No	512K	DR DOS 6
Tricom	(03) 388 2285	Tricom	$1540	120	4M	1.2	No	1M	Mouse
Pulsar Technics	(03) 482 3006	Pulsar	$1420	80	2M	1.2 or 1.44	16K	512K	Mouse
DPC Superstore	(03) 818 1893	Mapleleaf	$1670	80	2M	1.44 or 1.2	No	1M	Mouse
Southern Micros	(02) 630 0735	Southern Micros	$1350	80	2M	1.44 or 1.2	No	512K	

486DX/50 PCs: summary of features

Dealer	Phone	Brand	Best price	HDD	RAM	FDD	Cache	SVGA	Extras
The Computer Shop	(03) 578 2477	IAC	$3179	105	4M	1.44 or 1.2	256K	512K	None
Rod Irving	(03) 663 6151	Ritron	$3089	105	1M	1.44 or 1.2	256K	512K	DR DOS 6
Rod Irving	(03) 663 6151	Ritron	$3189	125	1M	1.44 or 1.2	256K	512K	DR DOS 6
Rod Irving	(03) 663 6151	Ritron	$3689	200	1M	1.44 or 1.2	256K	512K	DR DOS 6
Suit Electronics	(03) 486 1946	Suit Microsystems	$2350	42	1M	1.2	256K	512K	None
Tricom	(03) 388 2285	Tricom	$2600	120	4M	1.2	256K	1M	Mouse
Pulsar Technics	(03) 482 3006	Pulsar	$2690	80	4M	1.2 or 1.44	256K	512K	Mouse
Super Personal Computers	(03) 543 3755	Super PC	$2395	42	4M	1.44 or 1.2	256K	512K	None
DPC Superstore	(03) 818 1893	Maple Leaf	$2890	80	4M	1.44 or 1.2	256K	1M	
G Y Computer Solutions	(02) 879 4368	G Y Computer	$2660	130	4M	2FDD: 1.44 & 1.2	256K	1M	None
UTC Computers	(02) 958 0290	UTC	$2660	210	4M	2FDD: 1.44 & 1.2	256K	1M	Mouse DOS 5.0 Windows 3.1
Pacific Microlab Computer Centre	(02) 223 2433	Arrow	$4099	210	4M	2FDD: 1.44 & 1.2	256K	1M	Mouse Windows 3.1 DOS 5.0 anti-virus software power surge protector

MicroMania

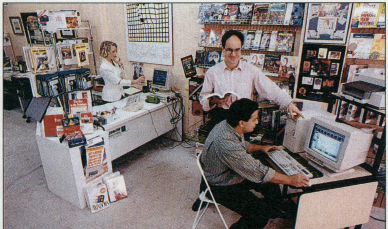
The growing sophistication of computer users in recent years has made mail order a viable, fast-growing market sector, said Marco Nussbaumer, managing director of Sydney-based dealer MicroMania.

The company, which has been around since 1984, currently splits its business between an Australia-wide mail-order operation and a service-oriented dealership for small, medium and large businesses.

Nussbaumer claims that the mail-order buyers his company deals with are comfortable with ordering peripherals, software, boards and even hard disks through the mail, as well as capable of doing much of the installation themselves.

"Most people who buy through mail order know what they're doing," Nussbaumer said, "and if they have problems, then our technical staff guide them over the telephone." Mail order has become a more accepted form of buying for many because "people are much more knowledgeable than they were a few years ago," he said. "Now, you have small-business people or home users installing systems and software in a way which we would never dream was possible in the past."

While MicroMania hasn't set itself up as a world beater, Nussbaumer claims it is doing a good business out of its Sydney office and is capable of providing excellent mail-order services across Australia. He says that although many users are well serviced by the large retail chains, there is a corps of buyers who will pay a premium and order through a mail-order house because of the service and support provided.



BY DARREN EDWARDS

MicroMania has been filling a niche for several years now, providing product and services for companies not willing to buy at the 'volume' retail end of the market or from larger, more impersonal dealerships. Buyers want product fast, and by using an efficient courier service, most software and hardware orders are processed and despatched within a few hours of the order being taken, and, more importantly, delivered within a two-day timeframe outside of Sydney, and within a day in the Sydney area.

MicroMania's approach to the mail-order market is a little more low key than many other companies, and much more personal. The company, according to technical manager Fred Baudat, is not trying to be all things to all people; instead it is concentrating on selling products that require some support or that are comprehensively supported by the main distributor. Most of the main products from WordPerfect, Lotus and Microsoft are supported by the local subsidiaries of those companies, rather than mail-order houses such as MicroMania. "We tend to only sell bulk resourced software which can be supported in Australia by ourselves or the Australian distributor," Baudat said. "We won't sell direct imports." However, for most mail-order buyers the first point of contact is the dealer, so Baudat has attempted to build a support structure at the company which recognises this fact.

While software sales are a real staple of the mail-order market in Australia, MicroMania has managed to make hardware sales the backbone of its business. MicroMania sells a wide range of laser printers, mice and scanners, display cards, modems and fax cards, as well as monitors, PCs and notebooks. "Hardware is actually our strongest area and is something we are building on," Nussbaumer said. "The sale and support of hardware is probably what we do best."

Despite the fact that MicroMania is selling a good deal of hardware and software in an otherwise depressed Australian marketplace, Nussbaumer believes that expansion is currently not on the cards.

"The way the economy is going, we have to be careful to consolidate and perform as well as we can in our current form. Over the past year, we've been placing more emphasis on higher margin services, such as consulting and networking," Baudat said.

MicroMania can be contacted on (02) 560 0811 for sales and support, or faxed on (02) 568 2196.

PC Super Market Buyer's Protection Scheme

Buy With Confidence

Buying direct from magazine advertisers is becoming an increasingly popular way to purchase PC hardware and software. *PC Super Market* has been launched to provide a one-stop guide to the best products currently available at the best prices.

To protect our readers, we back all adverts appearing in *PC Super Market* with our 'Buyer's Protection Scheme'. The Scheme offers two great benefits:

1. The Payment Protection Plan — Where a supplier goes into liquidation after receiving your order and full payment, but before actually supplying the goods, we will reimburse to you the amount you have paid to the supplier in respect of that particular order; provided your order has been registered with us.

2. The Problem Clinic — If you encounter any problem with a product purchased through the Scheme within 12 months of the product order being registered with us (see below), and the supplier won't put things right, we will liaise with the supplier on your behalf to try and sort the problem out. This benefit is non-transferable and applies to the original registered purchaser only.

The Scheme applies to all orders placed with suppliers in direct response to an advertisement in *PC Super Market*. To register a purchase with the Scheme, simply order goods from the supplier in the normal way and then complete the *PC Super Market* Registration Form on Page 20. Give your personal details along with details of the purchase you wish to register. Post the form along with a self-addressed stamped envelope to us within 7 days of ordering. The Scheme only protects orders placed within a cover month in which the advertisement for the specific product appeared (for example, the valid period for the October issue is until November 30).

What protection do you get?

The Payment Protection Plan:
ACP Publishing Pty Ltd limits its responsibility under the Payment Protection Plan to:
(a) a maximum of $10,000 total payments to a registered party in respect of each advertiser;
(b) an aggregate maximum of $100,000 total payments in respect of all claims by a registered party during any year commencing July 1.

The Problem Clinic:
If you encounter problems with a product, within 12 months of registration with us, we ask that you first give the supplier the opportunity to put things right. If you fail to get satisfaction from the supplier, the Problem Clinic will liaise with the supplier to try and resolve your problem. We cannot, however, give product support relevant to specific products. If you need assistance with a delivery problem, before contacting us please allow 28 days from the date on which you place your order to allow advertisers to cope with fluctuations in demand.

Claiming under the Scheme:
(i) Before providing the benefits of the Scheme, we will require proof of full payment by you to the supplier.
(ii) Payment under the Payment Protection Plan will only be made after other liable parties (such as insurance and credit card companies) have met their liability to you in full.
(iii) Claims under the Payment Protection Plan must be made in writing in the prescribed form (available on request). Claims will only be met where the appropriate claims form is lodged with us within 30 days of the liquidation of the supplier. Claims forms must be sent or delivered to GPO Box 37, Sydney NSW 2001.
(iv) Payment under the Payment Protection Plan will not be made if the claimant is found to have an association or relationship with the advertiser or its directors who are the subject of the claim.

Ambit of the Scheme:
PC Super Market's Buyers Protection Scheme is available only to parties resident or carrying on business in Australia.

Recovery by ACP Publishing Pty Ltd:
ACP Publishing Pty Ltd reserves the right to seek recovery from a liquidated supplier of any sums paid to you under the Payment Protection Plan. All we ask is that you give us your full co-operation, including executing any formal documentation required.

Before Buying

1 Use the *PC Super Market* Buyer's Template on Page 52 when ordering. This will ensure that both you and the supplier have all the information needed.

To Register

1 Fill out the *PC Super Market* Buyer's Protection Scheme Registration Form on Page 20. Make sure to fill out all details including the page the advertisement appeared.

2 Mail the completed Registration Form to *PC Super Market* together with a self-addressed envelope.

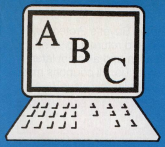
3 On receipt of your Registration Form we will issue you a reference number for that purchase. This will be mailed to you. You should keep this on file and be ready to quote it in case of enquiry.

Conditions

1 The order must be placed in direct response to an advertisement in *PC Super Market* only (i.e. not from brochures or other promotional material sent in response to an enquiry). The order must be placed no later than the end of the cover month in which the advertisement appeared (for example, before November 30 for this issue).

2 Details of the order must be registered using the *PC Super Market* Buyer's Protection Scheme Registration Form on Page 20 no later than seven days after the order has been placed with the advertiser.

3 The Buyer's Protection Scheme applies only to *PC Super Market* advertisements. Advertisements appearing in other areas of *Australian Personal Computer* are not covered.



Australian Budget Computers

Pty Ltd

982 Victoria Road,West Ryde, 2114 NSW, Australia
Phone: (02) 808 3533, 808 3557 Facsimile: (02) 807 1159
Trading Hours: **MON - FRI** 9.00AM - 6.00PM
SAT 9.00AM - 4.00PM

ACT 386SX-25

* 2 Mb RAM
* 42 Mb Hard Disk Drive
* 1.44 Mb Floppy Drive
* Super VGA Colour Monitor (1024x768)
* 512 Kb SVGA Card
* 101-key Honeywell Keyboard
* 2 Serial/1 Parallel/1 Games Ports
* Mini-Tower Case

PRICE: $1400

ACT 386DX-40

* 2 Mb RAM
* 80 Mb Hard Disk Drive
* 1.44 Mb Floppy Drive
* Super VGA Colour Monitor (1024x768)
* 512 Kb SVGA Card
* 101-key Honeywell Keyboard
* 2 Serial/1 Parallel/1 Games Ports
* Mini-Tower Case

PRICE: $1632

ACT 486DX-33

* 4 Mb RAM
* 210 Mb Hard Disk Drive
* 1.44 Mb Floppy Drive
* Super VGA Colour Monitor (1024x768)
* 512 Kb SVGA Card
* 101-key Honeywell Keyboard
* 2 Serial/1Parallel/1 Games Ports
* Mini-Tower Case

PRICE: $2890

EXTRAS:	
80 Mb Hard Disk to 120Mb	$150
Keen Mouse	$30
Agiler 210 Mouse	$55
Additional 2 Mb RAM	$140
Additional Floppy Disk Drive	$90

MICROSOFT SOFTWARE
(MUST BE PURCHASED WITH A SYSTEM)

DOS 5.0	$95
Windows 3.1	$95
DOS 5.0 & Windows 3.1	$175

PRINTERS

Panasonic KX-P1180 9-Pin	$295
Fujitsu DL900 24-Pin	$460
Fujitsu DL1100 24-Pin	$575
Canon Bubble Jet	Call

ACT SYSTEMS COME WITH 3 YEARS LABOUR AND 1 YEAR PARTS WARRANTY.

ALL PRICES MAY CHANGE WITHOUT PRIOR NOTICE.

WE ALSO ACCEPT MAIL ORDER.

ACN 051 529 134

PC Super Market

In order to register your purchase under the Buyer's Protection Scheme, you must complete this coupon and return it to us no later than the end of the month of publication and also not later than 7 days after the placement of the order (ie: all coupons must be post-marked prior to November 30, 1992 for this issue).

BUYER'S PROTECTION SCHEME REGISTRATION FORM

SUPPLIER DETAILS

Name _____
Company _____
Address _____
_____
_____
Postcode _____
Telephone _____
Fax _____

CUSTOMER DETAILS

Name _____
Company _____
Address _____
_____
_____
Postcode _____
Telephone _____
Fax _____

These items were bought from an advertisement appearing in PC Super Market on page _____ of issue _____

Quantity	Detailed description of the items (for software include version number)	Unit cost	Total price

DELIVERY DETAILS

Method of delivery _____
Date of despatch _____ Date of delivery _____
Delivery address _____
_____
_____
Postcode _____

SUB TOTAL	
DELIVERY	
PACKAGING	
SALES TAX	
GRAND TOTAL	

METHOD OF PAYMENT

Purchase Order · Cheque · Postal Order · Credit Card (Delete as applicable).

Credit card company _____ Credit card number [| | | | | | | | | | | | | | | |]

Expiry date _____ Signature _____

FOR ACP PUBLISHING PTY LTD USE ONLY

Please don't forget to send this coupon together with a self addressed envelope to:

PC Super Market
ACP Publishing Pty Ltd,
GPO Box 37
Sydney NSW 2001.

REPLY PC Super Market acknowledges receipt of your Buyer's Protection registration card.
We have allocated the reference number [ ] to your purchase.

Please quote this reference number in all future correspondence.
Thank you for buying through PC Super Market.

Please note you will be required to produce this coupon as proof of registration.
Please keep it in a safe place.

YESTERDAY

TODAY

TOMORROW



All dealers enquiries welcome

Australian Owned

Ultra High Performance

Service Backed By A Dedicated Team

Technology At The Forefront

Ensured By Extensive Testing

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AUSTEK

COMPUTERS PTY LTD

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Telephone: (02) 669 3388 Facsimile: (02) 313 4571



For Service With a Smile and Prices So Low...

ABC Flowcharter



BUSINESS

★ **ABC Flowcharter**	**$299.00**
Address Book Plus 3.0	$79.00
After Dark 2.0	$59.00
Autodesk Home, Kitchen, Bathroom	$69.00
Autosketch 3.0	$155.00
Autosketch 3.0 Windows	$225.00
Borland C++ 3.1 & Application Framework	$775.00
Brooklyn Bridge	$139.00
Central Point Anti-Virus Dos or Windows only	$125.00
Central Point Backup	$125.00
Central Point Scrapbook	$145.00
Clarion Professional	$675.00
Clipper 5.01	$875.00
Copy II PC Deluxe Option Board	$199.00
★ **Corel Draw 3.0 Special offer**	**$375.00**
Desqview 386 2.4/6.0	$215.00
Desqview/X	$289.00
Direct Access Dos or Windows	$99.00
Dr Dos 6.0	$74.00
Dynamic Memory Control	$99.00
Expert Animator; Calendar; Home Design; Landscape; Expert Paint'n Print; Perfect Labels; Personal Roots; Expert Publisher; Resume Writer; Utilities; only	$24.95
Express Publisher 2.0	$199.00
Express Publisher Windows	$275.00
Facelift Companion	$199.00
Facelift for Windows	$115.00
Family Tree Maker	$85.00
Fastback Plus 3.04 or Windows	$199.00
First Choice 3.1	$69.95
Flowcharting III	$269.00
Generic Cadd 6.0	$499.00
Geo Works Pro	$225.00
Grammatik Windows 5.0 British version	$149.00
Harvard Draw Windows	$299.00
Harvard Graphics 3.0 or Windows	$569.00
Hijaak	$295.00
Home Medical Advisor 2.0 (New)	$135.00
Info Select 2.0	$189.00
Key Cad Complete; Key Calendar Plus; Key Chart 2000; Key Correspondence; Key Dictionary 3.0; only	$69.95
Key Draw Plus	$115.00
Key Draw Plus Windows	$115.00
Key Fonts for Windows 3.1 100 Truetype Fonts	$69.95
Key FormDesigner Plus for Windows	$69.95
Learn to Use Dos	$19.95
Learn to Use Your PC	$19.95
Lotus 123 2.4	$470.00
Lotus 123 Windows	$499.00
Lotus 123 for Windows & Ami Pro	$470.00
Lotus Freelance 4.0	$559.00

Corel Draw 3.0
Special Offer



PC Tools 7.1



Managing Your Money 8.0 by Andrew Tobias	$99.00
Micrografx Designer	$599.00
MS Office for Windows	$780.00
MS Publisher	$235.00
MS Visual Basic Prof Toolkit	$380.00
★ **MS Works 2.0 3.5**	**$199.00**
Multiwriter – 30 Languages	$199.00
My Backup; My Database; My Invoices; My Label Maker; My Mail List; My Phonebook; My Quick Writer;	$34.95
My Treasurers; only	$29.95
Netroom	$79.00
Nodemap	$225.00
Norton Desktop for Dos	$105.00
Norton PC Anywhere 4.5	$185.00
Norton Utilities 6.01	$115.00
On Target	$149.00
Org Plus Advanced 6.0	$135.00
Org Plus Advanced Windows w/Adobe Type Mngr	$215.00
Packrat 2000 Accounting Free Video	$350.00
★ **PC Tools Deluxe 7.1**	**$150.00**
Power Menu	$135.00
Print Shop Deluxe	$119.95
Print Shop Deluxe Business	$69.95
Print Shop Deluxe Sampler	$69.95
Print Shop	$79.95
Print Shop Companion	$59.95
Professional File	$299.00
Professional Plan	$79.00

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OZZIE CLUB MEMBERS RECEIVE A FURTHER 5% REBATE IN OZZIE DOLLARS

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Please call (03) 521 2222, or interstate call (008) 337 481
Fax: (03) 510 1485

★ TRADING HOURS ★

PRAHRAN		FRANKSTON & KNOX CITY		PACIFIC FAIR	
MON - THURS	9.00am - 5.30pm	MON - WED	9.00am - 5.30pm	MON - WED & FRI	9.00am - 5.30pm
FRIDAY	9.00am - 9.00pm	THUR & FRI	9.00am - 9.00pm	THURSDAY	9.00am - 9.00pm
SATURDAY	9.00am - 5.00pm	SATURDAY	9.00am - 5.00pm	SATURDAY	9.00am - 5.00pm
SUNDAY	10.00am - 5.00pm	SUNDAY	Closed	SUNDAY	10.00am - 5.00pm

• **MANY MORE AVAILABLE** • **Place order by mail, phone or call in & see us!** *(Order form on opposite page)*

...Don't Forget - There's Just One Place to Go!

Quattro Pro WinDOS



Professional Write Plus	$259.00
Publishers Powerpak for Windows	$89.00
Q & A 4.0	$379.00
Q-Dos III	$79.00
QAPlus 4.6	$199.00
QAPlus/fe	$395.00
QEdit Advanced	$99.00
Qemm 386	$99.00
Qram 286 2.0	$99.00
Quattro Pro 4.0	$499.00
Quattro Pro Dos & Windows	$575.00
Quick Schedule 3.1	$139.00
Quicken 6.0 with Tax Pack	$105.00
Quote Rite	$199.00
Readright OCR for Dos or Windows	$499.00
RTLink Plus 5.1	$499.00
Screen Extender Wordperfect	$140.00
Sidekick 2.0 3.5	$99.00
Sideways V3.3	$99.00
Stacker 2.0	$170.00
Success Inc Business Plan Presentation	$99.00
Superstor 2.0	$175.00
Swiftcalc	$69.95
The Far Side Computer Calendar	$99.00
Toolworks Backup Pro	$89.95
Timeline 5.0 Dos or Windows	$750.00
Turbo C++ for Windows	$245.00
Turbo Pascal 6.0	$175.00
Typequick	$79.00
Typing Tutor 5	$59.95
Ventura Publisher 3.0 Dos	$799.00
Ventura Publisher 4.0 Windows	$799.00
Virus Secure for Windows	$125.00
Vistapro Art Program	$199.00
Winfax Pro	$205.00
Windows Draw	$145.00
Winsleuth w/ Co-sessions	$175.00
Word for Word Pro 5.0	$125.00
Word Writer	$59.95
Wordperfect 5.1 Dos or Windows	$425.00
Wordperfect Works	$169.00
Wordstar for Windows	$399.00
Working Hours	$105.00
★ XTree Gold for Windows	$59.00

CD ROM

Battlechess MPC	$79.95
Britannica Family Choice	$225.00
Chessmaster 3000 MPC	$135.00
Compton's Family Encyclopaedia	$399.00
King's Quest V	$89.95
Loom	$115.00
MS Beethoven – 9th Symphony	$105.00

XTree Windows



Sound Blaster Pro 2.0 with Midi Interface



MS Bookshelf for Windows	$245.00
Secret Weapons of Luftwaffe	$159.95
Sherlock Holmes Consulting Detective	$99.95
Sleeping Beauty MPC	$59.95
Spirit of Excalibur	$69.95
Supremacy	$69.95
Wing Commander & Ultima XI	$115.00

SOUND CARDS & PERIPHERALS

Flightstick Joystick	$89.00
Gravis Analog Joystick	$79.95
I/O Systems 3500 Mouse	$29.95
Joystick Omega	$24.95
Lynx Console	$149.00
Mouse Pen Pro PC or Portable	$135.00
Pro Audio Spectrum 16 – 20 Voice Sound Card	$425.00
Sound Blaster 2.0	$165.00
Sound Blaster Pro 2.0 Basic	$325.00
Sound Blaster Pro 2.0 w/Midi Interface	$350.00
Sound Galaxy BX w/Speaker	$145.00
Sound Galaxy Internal CD-Rom Kit	$499.00
Sound Galaxy NX w/Speaker	$229.00
Sound Galaxy NX Pro	$299.00
Video Blaster	$699.00

Discount

OZZIE SOFTWARE

"We Won't be Beaten on Price!"

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PH: (03) 521 2222
TOLL FREE (008) 337 481
FAX: (03) 510 1485

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SHOP 1090
KNOX CITY
SHOPPING CENTRE
(NEXT TO MEDICARE)
PH OR FAX: (03) 887 0161

GOLD COAST
SHOP 314
PACIFIC FAIR
SHOPPING CENTRE
PH: (075) 724 200

FRANKSTON
QUAYSIDE SHOPPING CENTRE
CNR. STATION STREET &
SHANNON STREET MALLS
PH: (03) 770 2527
FAX: (03) 783 4395

ORDER FORM - Mail, Phone or Call in & see us!

PLEASE RUSH ME THE FOLLOWING ITEMS*:

* If ordering more than 2 items please attach separate list

1 ..... at $..... each

2 ..... at $..... each

I wish to pay using: (Please tick)

I have enclosed my cheque/money order for $.....

Disk Size: ☐ 5.25" ☐ 3.5"

☐ Bankcard ☐ Visa ☐ Mastercard ☐ Diners.

Debit credit card no

Signature..... Expiry Date.....

Mr/Mrs/Miss/Ms.....

Address.....

.....

Postcode.....

Phone No..... Membership No.....

APR/NOV

For affordable networking call Reliable Network Centre

NETWORKS IN A BOX!



Easy Networker/S

Full 2 user serial port based WEB network, includes software, manual, 7 metre cable, beats Laplink hands down! **$199.00**

Easy Networker/E

Uses industry standard ethernet adapters and award winning WEB software, network from 2 to 900 PCs, each kit contains one 16 bit NE 2000 compatible ethernet card, network software, 7 metre cable, all connectors and terminators for only **$299.00**



Windows for Workgroups

The revolutionary Windows peer-to-peer network, includes a network version of Windows 3.1, Group Calendar, Scheduler and Electronic Mail, our kit consists of Windows for Workgroups software, 16 bit ethernet adapter, 7 metre cable, all connectors and terminators for only **$495.00**

ETHERNET PRODUCTS

We have unbeatable pricing on Novell Certified Ethernet Network cards!

NE 2000 compatible 16 bit ethernet cards

	coax	**$160.00**
	10 Base T	**$180.00**
	Combo	**$215.00**
10 Base T 8 port hub		**$895.00**
Pocket Ethernet Adapter		**$395**

NOVELL NETWARE

NOVELL

Call us for all of your Novell Netware needs!

Netware Lite v1.1 per node	**$150.00**
Novell Netware v2.2 *5 user*	**$1,095.00**
Novell Netware v2.2 *10 user*	**$2,295.00**
Novell Netware v3.11 *5 user*	**$1,295.00**
Novell Netware v3.11 *10 user*	**$2,895.00**
Novell Netware v3.11 *20 user*	**$3,895.00**
Other Novell Netware pricing	**Call**
We specialise in Novell Upgrades!	
AMTEC Menu Plus for Netware	**Call**

WEB Peer-to-Peer Networks

The "LAN Times" Award winning network operating software for peer-to-peer networks from 2 to 900 nodes, single node $150.00, discounts on larger networks.

Please call for a competitive price on any networking products. Installation services available. All prices include sales tax. Novell Netware is a registered trademark of Novell Inc.

RELIABLE NETWORK CENTRE
Level 6, 35 Spring Street, Bondi Junction NSW 2022
Ph (02) 369 1158 Fax (02) 389 2363
Free Call 008 808 913



EVERYTHING YOU NEED FOR ONLY $199

Now you can connect two PCs and enjoy ALL of the features of a full local area network without interface cards.

Easy Networker is a cost effective system for networking two IBM compatible PCs through a serial port cable to enable them to share programs, data, printers and peripherals.

Easy Networker is not a glorified file transfer program. It is a complete two user peer-to-peer Local Area Network based on the WEB 3.0 Network Operating System which won the prestigious "Best of Times" Award for peer-to-peer Network Operating Systems given by the US "LAN Times" magazine.

Easy Networker does not require a dedicated server. It allows you to use your PCs while the network works in the background. It enables you to share multiple printers on each PC as well as run multiuser software. It is totally compatible with "Windows" and supportsit in all modes.

And Easy Networker is upgradeable to the full WEB Network Operating System running on industry standard Arcnet & Ethernet cards.

Easy Networker specifications:

- Enables PCs to share programs, data, printers and peripherals
- Does not require a dedicated PC as a server
- Easy Installation, only 10 minutes per PC
- 100% compatible with MS DOS 3.1 - 5.0
- Supports all IBM and 100% compatible computers
- Supports Windows 3 x in Real, Standard and Enhanced Modes
- Supports DOS Share for multiuser applications
- Supports up to 4 parallel devices and 3 serial devices per PC
- Has built in Electronic mail
- Can be used in conjunction with Novell networks.

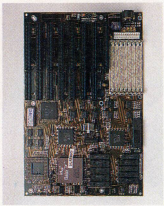
Each Easy Networker Kit contains everything that you need to link two IBM compatible PCs including software, manuals and 7 metre serial cable.

RELIABLE NETWORK CENTRE
Level 6, 35 Spring Street, Bondi Junction NSW 2022
Ph (02) 369 1158 Fax (02) 389 2363
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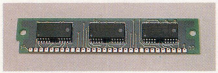
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DATA EXPERT
Opti Chipset



Mitsubishi Ram
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Case Family, Sturdy, High Quality



Chinon Floppy Drive
Japanese Made



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Hard Drives



Ortek Keyboard Japanese
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Power Supply
TUV Approval



FALCON NOTEBOOK - $ 2695

* 386SXL 25MHz
* SXL chipset LOW power consumption
* 4MB NEC 70 n/s
* 640x480 SHARP CCFT Backlit LCD VGA 64 Greyscales
* 1 x 1.44MB Floppy Drive (Japanese)
* 80MB Hard Drive (120MB/210MB opt.)
* External VGA Port
* External Keyboard Port
* 1 Parallel Port
* 1 Serial
* 82 Key Keyboard - Japanese ALPS Switch
* 2Hrs Battery Life
* 12V Car Adaptor Available
* DR DOS 6.0 (Win 3.1 Compatible)
* Carry Case
* 3.2 Kgs

The FLOPTICAL Revolution

The next revolution in floppy disk drives has arrived and it's name is " Floptical ". The floptical drive is a 3.5" disk drive which with a floptical diskette will store up to 20MB uncompressed on a single 3.5" floptical disk. This storage capacity makes it ideal for many applications, replacing older, slower or more cumbersome technology.

How It Works

The drive actually looks like any other 3.5" drive running from a SCSI card and it is fully downward compatible, accepting standard 1.44MB and 720K diskettes. The floptical advantage lies in the patented optical tracking system similar to that of a CD player that allows it to record magnetic information more precisely than ever before using an LED on indelible tracks within the diskette. This method gives the floptical diskette a recording density of 1245 tpi (tracks per inch) compared to 135 tpi on a regular floppy. The indelible tracks make the diskette more reliable and the SCSI interface allows soft sector formatting and (ECC) error checking and correction.

Applications

Back Up - Backing up with a floptical is quick and economical, it is faster than a tape backup and also allows recovery of a specific portion of data without retrieving the entire backup.

Desktop Publishing - Desktop publishing and Image storage had come to a bottleneck until now with the inability to economically transfer large files to and from other machine's (eg. at a graphic artist's office).

Distribution - As application software becomes larger the need for a media which can handle more than just 1.44MB of data will increase. The floptical drivre is the obvious answer replacing 14 or more individual 1.44MB diskettes.

The brand of the floptical drive is INSITE (a US company) and they are produced in Japan by Matsushita Kotobuki Electronics, one of the worlds largest floppy disk drive and VCR manufacturers. The floptical standard has received acceptance from major international companies such as 3M and Hitachi-Maxell who produce the 20MB floptical diskettes.

FLOPTICAL DRIVE and CONTROLLER	$ 698
20MB FLOPTICAL DISKETTE	$ 40

Maestro
Modems
Austel Approved
Australian Made
Unbeatable Value



PRINTERS

Fujitsu DL900 BLK	$ 399
Fujitsu DL1100C	$ 499
Panasonic KXP 1180	$ 295
Star LC10 II	$ 295
Olivetti JP150	$ 550
Olivetti JP350S	$ 795

Dealer Enquiries Welcome

CD - ROM DRIVES
SOUND CARDS

Sound Galaxy BX	$ 175
Sound Galaxy NX	$ 285
Sound Galaxy NX Pro	$ 350
Sound Galaxy CD ROM	$ 550
CD ROM & NX Card	$ 780

Sound Galaxy includes free speakers and a full compliment of software



DOWN UNDER ELECTRONICS
Importer - Manufacturer - Wholesaler - Retailer

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Brisbane, QLD 4051

Fax : (07) 856 4181

EST 1985

TOLL FREE : 008 808 404

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DM
Data Machine

MicroMania

LEADING IN • QUALITY • PRICE • SERVICE

ACCOUNTING

Attache 4	729.00
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SBA	590.00
Charter Series	call
Sybiz & Sybiz f. Windows	call
DAC Easy 4.15	430.00
MYOB	415.00



COMMUNICATIONS

Procom Ten Windows	154.00
Procomm Plus V2.0	129.00
Carbon Copy Plus 6.0	210.00
Crosstalk XVI V3.8	199.00
Crosstalk Mk. 4	240.00
Crosstalk for Windows	199.00
Softerm PC	379.00
Smarterm	call
PC Anywhere 4.5	259.00
Laplink Pro V4	215.00
Brooklyn Bridge 3.5	165.00
Hyper Access OS/2	call

TRAINING

PC Tutorial	119.00
Typequick	89.00

INTEGRATED

PFS: First Choice 3.0	189.00
Symphony 2.2	845.00
MS Works Windows	239.00
Open Access III	920.00
Geoworks Pro	225.00

DTP

Publish It!	240.00
PFS: First Publisher 3.0	199.00
Pagemaker 4.0	999.00
Ventura Publisher 3 Gold	989.00
Express Publisher 2.0	235.00
Aldus Publishing Collection	call

PROJECT MANAGEMENT

Superproject Expert 2.0	795.00
Superproject for Windows	795.00
Harvard Project Manager	829.00
Timeline 5	840.00
MS Project for Windows	849.00
On Target	420.00
Project Scheduler 5	965.00

WORDPROCESSING

Q & A Write	199.00
Wordstar V 7.0	520.00
Wordperfect for Windows	539.00
Wordperfect V 5.1	529.00
AMI Professional V 3.0	499.00
Just Write Special	119.00

SPREADSHEET

Lotus 123 Rel. 3.1+	649.00
Lotus 123 Rel. 2.4	549.00
Quattro Pro 4.0 / Windows	579.00
Supercalc 5.1	169.00
Special 123 V1.I Windows & AMI Pro3 Bundle	660.00 580.00

GRAPHICS

Formtool Gold 3.0	139.00
Freelance Plus 4.0	595.00
Autodesk Animator pro	840.00
Graphwriter	679.00
Harvard Graphics V3	640.00
Cricket Graph Windows	225.00
Corel Draw 3.0	call
Drawperfect	549.00
PC Globe 5.0	109.00



CAD

Designcad 2D 5.0	465.00
Designcad 3D 4.0	620.00
Generic CADD 6.0	599.00
Generic 3D	425.00
Autosketch 3.0	185.00
Win	250.00
Easy Plot	399.00

PROGRAMMERS WORKSHOP

Btrieve V3.1	889.00
Xtrieve Plus V4.1	1390.00
Turbo Professional 5.1	270.00
Async Plus V5	310.00
Power Screen V1.1	229.00
Brief V3.1	350.00
Zortech C++ Developers	870.00
Multi-Edit V5 Professional	299.00
Windows Maker Pro	1299.00
for other Microway products	call

UTILITIES

Stacker	199.00
Desqview 2.4	169.00
Desqview 386	270.00
QEMM V 6	129.00
Xtree Gold 2.5	169.00
Xtree Pro Network	559.00
Xtree for Windows	75.00
Mace Utilities	175.00
Norton Utilities V6.01	199.00
PC Tools Deluxe V7.1 /W	240.00
Spinrite II V2.0	115.00
Check-It!	call
Norton Desktop /W	210.00
Superstor 2.0	175.00
Grammatik, V	175.00
Easy Flow V7.0	365.00

GAMES & EDUCATIONAL

for Games and Educational Software ..... call

Musical H/W & S/W

Soundblaster PRO 2.0	389.00
Roland LAPC Midi Soundcard	895.00
Roland Midi Interf. MPU-IPC	225.00
Duet Sequencer/Scorer	call
Tettra Composer	160.00
Voyetra Sequencers	call
Spectrum 16 bit stereo	389.00
ATI Stereo FX 1Mb	499.00

Multimedia Kits:

TP Multimedia Library	1190.00
Media Vision	from 1390.00
Sony	call

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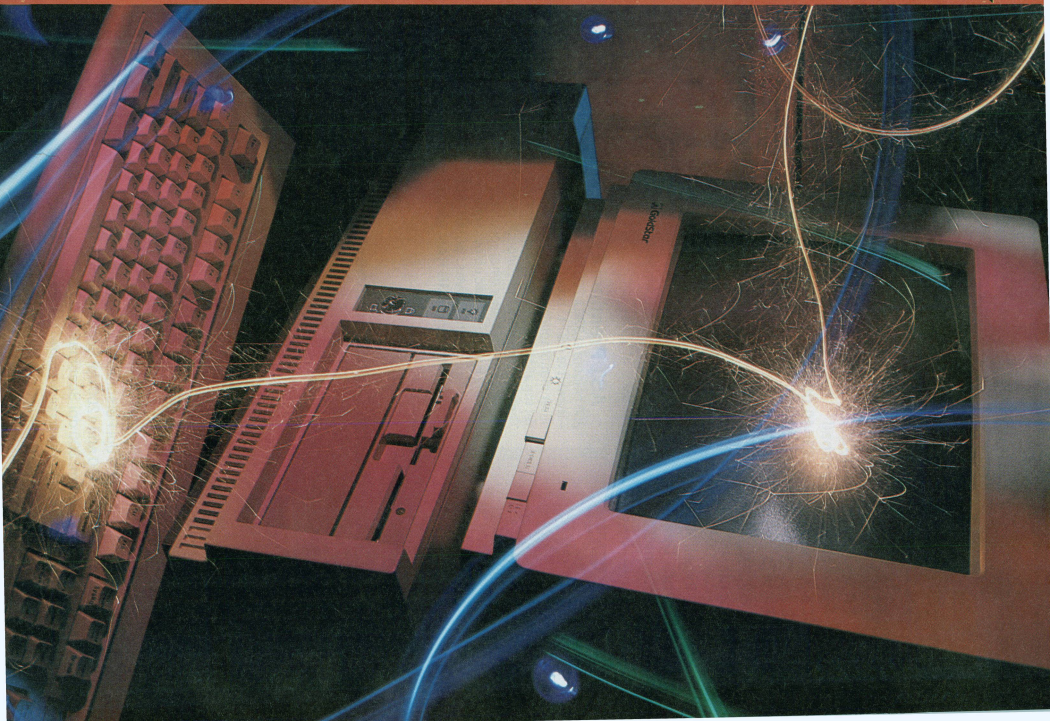
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Monitors in 20-20

You're going to spend a lot of time in front of your monitor, so it's important to buy a unit that won't let you down.

In this overview, we offer helpful hints for buying a monitor, and a primer on monitor technology.

BY MICHAEL AITKEN

If you're reading *PC Super Market*, it's likely that you're a regular user of PCs. If your work involves spending at least two hours per day staring at a computer, that adds up to around 500 hours a year. For many full-time computer users, however, that figure will be much higher.

Computer displays have strong potential to cause eye strain, significantly more so than reading words on paper. Affordable CRTs do not show text and graphics with the same resolution as a printed page (compare the print on this page to your monitor's display). A CRT display is redrawn constantly. If the redraw is too slow, the display can flicker. Further, text and graphics on a CRT may not have optimum clarity, due to poor design, manufacture or adjustment of the unit. Your eyes will adjust to a poorly performing monitor, and the ongoing eye strain can damage your sight.

This edition of *PC Super Market* features CRT monitors — the freestanding screens generally used with desktop machines — as opposed to LCDs (commonly found on portable computers) and other emerging display technologies (see Buyer's Guide tables on pages 59, 60 and 61).

TECHNOLOGY OVERVIEW

How CRT monitors work

The heart of the display device is called a cathode ray tube (CRT). It's a conical glass tube from which the air has been removed.

Monochrome monitors come with one electron gun found at the rear of the unit. On the flipside of the screen, the glass is covered with a phosphorescent coating. The picture we see is in fact a matrix of tiny dots, or pixels. In VGA mode, the picture is 640 pixels wide and 480 pixels high.

The CRT's electron gun fires a beam of electrons, which scans the pixels, varying in intensity according to the display adaptor's instructions. As it scans, the beam hits the phosphor coating. Light is emitted, and that emission persists for a fraction of a second after the electron beam has moved on.

Thus, the display is constantly drawn and redrawn. The speed with which this occurs is called the refresh rate of the monitor. The faster the refresh rate — typically 60 to 70Hz — the less likely the picture will flicker.

Colour CRTs work on the same principle as monochrome displays, with a few extra features.

For each pixel, a colour CRT has three separate phosphor dots — one for each of the primary colours. A palette of colours is produced by mixing the three primary colours — red, green and blue — in varying intensities.

Where a monochrome CRT only has one electron gun, a colour CRT has three — one for each of the three primary colours. The three electron beams are aimed to converge at the 'shadow mask', which is a finely perforated grid between the guns and the screen. The electron beams pass through a hole in the mask, and diverge on the other side to hit and energise their respective dots of phosphor.

Display performance

If a CRT is poorly designed, poorly adjusted, worn or damaged, picture quality will probably suffer, increasing the risk of eye strain.

The less sharp your text and graphics, the more tiring your monitor will be to use. If the display is fuzzy, your eyes will constantly try to bring it into focus. Picture sharpness in monochrome monitors depends mainly on the focus of the electron beam. With the more complex design of colour displays, there is more room for error.

Dot pitch is a key factor in monitor quality. The limits of a monitor's resolution will be determined by the distance between the holes in its shadow mask. As the dot pitch becomes larger, the electron beams become less precise, leaving you with a more grainy image.

For a 14in standard VGA monitor, a pitch of 0.31mm is an acceptable standard. Monitors intended for use in Super VGA display modes should have a finer pitch: 0.28mm is a common specification, and gives acceptable quality at 800 by 600 pixels resolution. Top-end monitors are appearing with smaller dot pitches. Moving to a bigger monitor will provide a larger shadow mask and better resolution for a given dot pitch.

Poor convergence is another problem that can affect the sharpness of a display. If the electron beams do not converge correctly, or the shadow mask is out of position (say, through jarring), the beams may illuminate the wrong phosphor dots.



For a 14in standard VGA monitor, a pitch of 0.31mm is an acceptable standard. Monitors intended for use in Super VGA display modes should have a finer pitch . . .

Poor convergence is indicated by colour fringing on bright white lines and text, as well as a general blurring of coloured graphics.

Cheaper monitors frequently suffer from poor linearity. On such monitors, characters may be stretched or compressed near the edges of the display, and straight lines may bend.

Poor power-supply regulation is another quality issue. Bright pictures need higher currents from the power supply. Poor regulation is indicated if the picture shrinks and expands as the level of brightness changes.

Finally, reflection or glare from the screen will make it tiring to use. Care should be taken when positioning the screen in relation to light sources. Anti-reflective coatings can reduce the amount of glare that comes off the screen.

Checking out your monitor

Some monitor problems can be caused by poor design or specification (such as low-quality power supplies, or poorly engineered shadow masks). Some problems can be remedied with professional adjustment (such as linearity and convergence), and others may be a product of the monitor's age. While some top-end monitors are shipping with user-driven convergence and linearity controls, there is generally little scope to fix monitor problems without expert help. High voltages inside the monitor spell danger for amateurs attempting do-it-yourself repairs, and specialist equipment is often needed.

This means that the best times to test a monitor are before you part with your money and/or immediately after taking delivery.

Looking at applications that you will run on the machine is a good starting point — how do Windows applications look in high-resolution modes? With its use of white backgrounds and variable screen fonts, Windows is demanding on a display, and could be useful for checking a monitor even if you don't plan to run the package.

You can buy full-featured, monitor-evaluation software, such as Sonera Technologies' DisplayMate Video Display Utilities. For less sophisticated testing, many graphics adaptors and PC system disks come with monitor-testing routines.

The PC Labs Benchmarks contains useful tools for assessing video-card and monitor performance. The 10K EGAVGA.EXE program in the Benchmarks suite displays a number of test patterns which will help in assessing your monitor.

To check linearity, display a grid test pattern. Check that all lines are straight, and that the pattern is symmetrical. You do not want to see any distortion in the shapes, or curves in straight lines.

To check the monitor's convergence performance, display one of the colour palettes and check the purity of the colours. In particular, look for inconsistency in colour blocks and bleeding of colour around the edges. Display a bright, white line, and then check for any discolouration or bleeding of colour.

When buying a PC, it's tempting to simply accept the monitor that comes with the system, as long as it can handle the display mode that you require.

But to minimise eye strain, and to avoid paying too much for a low-quality product, it is important to check out a monitor before you buy it, and check it regularly during its service life.

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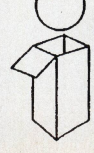
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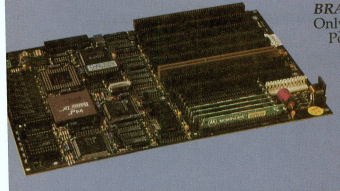


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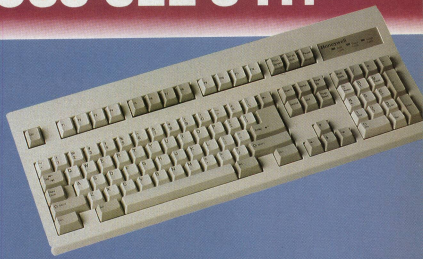
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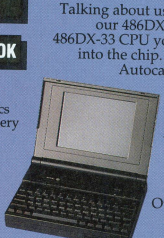
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Third Party Maintenance

It's great to have a PC when it's working, but when it's not, it's really no more than a massive paper weight. So, when you're buying a new computer, don't ask yourself what you'll do if it breaks down, ask yourself how you'll cope *when* it breaks down.

There's an old saying which could have been created with countless hard-done-by computer users in mind: you don't know what you've got 'til it's gone.

When you shop for a PC through the mail, you aren't just shopping for a new computer, you're shopping for a tool that will become an important part of your work or home life. The first thing to think about is the type of maintenance and support you will get with your machine. Who will repair it when it breaks down? Will they carry out onsite repairs or will you have to lug it into some factory in a far flung suburb you've never heard of? What does a five-year warranty mean? What do you get for it and what can you do if you don't want it?

These questions are just part of the great pre-buying checklist that all buyers of PCs and peripherals should go through before signing a cheque or singing their credit card number down the phone.

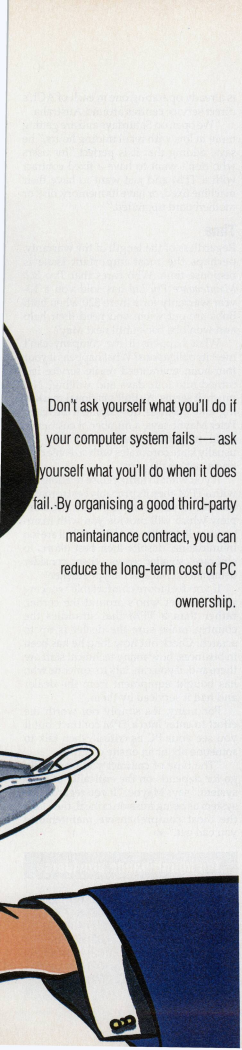
"A PC is like your left arm. If you lost it you'd get very irritated and you wouldn't want even a day to go by without it being sewn back on," says Urs Mader, managing director of one of Australia's largest third party maintenance (TPM) companies, ACL. "It's an important issue and you need a good maintenance contract."

Maintenance is an important part of the buying process, especially if a PC or printer is job critical. Ask yourself, if your machine goes down how long can you live with out it? Find the right company and tailor your maintenance needs to your answer. Being caught without a good maintenance contract, is like getting sick without health insurance. It's worth remembering, however, that buying any type of insurance presents a dichotomy.



BY DARREN EDWARDS

Don't ask yourself what you'll do if your computer system fails — ask yourself what you'll do when it does fail. By organising a good third-party maintainance contract, you can reduce the long-term cost of PC ownership.



On the one hand, if you need help, you end up paying less in the long run; but if your PC never breaks down, you can't get your money back.

First up the choice is fairly straight forward. You either take the manufacturer's warranty, which might be anything from a year to five years in length, or you extend or cross over to a contract with a third party maintenance company.

When you're buying over the phone or via mail order, it's worthwhile asking who will fulfil the maintenance contract. Chances are it will be a TPM company and you can either sit with the maintenance contract that comes with the machine or extend it to suit your needs. If you're not satisfied with the company providing the maintenance, then go elsewhere.

More often than not, national TPMs have wide geographical cover and the ability to respond quickly to a large number of calls at any one time. In addition, when a smaller reseller uses a TPM it gives buyers the assurance that if the dealer goes down, they will have continuity in their maintenance contract.

A contract with a TPM, either arranged independently or through a dealer, means that if your reseller goes belly up you'll still have a solid contract in place to get your PC fixed if need be. Besides, says Colin Thompson, general manager of engineering at TPM outfit Mitsui, "dealers usually want to concentrate on sales effort, not in doing the nuts and bolts of maintaining the product."

The next thing to consider is, is it okay to stick with a manufacturer's warranty, or do you need more cover? While offers of three to five-year warranties sound like a dream come true, it's important that you find out exactly what kind of assistance you'll get come the dreaded day your PC bites the big one. A warranty which, regardless of the length of time it covers, only offers return-to-base repairs, may not be enough for many users.

Thompson says many people stick with their manufacturer's warranty and only worry about extending their contracts after the PC's initial warranty finishes. This, he claims, creates some problems for TPMs.

"Two to three-year warranties are reasonable from a consumer's point of view; but from a service company's point of view they are very difficult," says Thompson. "There is essentially no revenue generated from a product for three or four years, so it makes it difficult to set up facilities to cater for demand. To some extent, long warranties limit the ability of TPMs to maintain products. If I haven't sold a product and a customer comes to me, I have no way of getting recompense."

While this may seem no great hardship for the user, people like ACL's Mader maintain that manufacturers' warranties, especially long term ones, are "probably not worth the paper they are written on. You won't know how good a warranty is until you use it, and even then you may not be terribly impressed" with the service provided.

However, if sticking with a manufacturer's warranty appeals to you, it's worth noting that you're paying through the nose for such warranties anyway, and more often than not they'll be serviced by TPMs who offer other, more comprehensive, maintenance contracts. Officials from research organisation IDC Australia claim that as much as $100 is whacked on to the final price of a PC to cover the cost of maintenance.

Despite the proliferation of TPMs, some PC makers claim they are better able to provide maintenance services to their customer base. Osborne Australia provides a comprehensive upgrade path to its PCs and varying levels of maintenance contracts, depending on the price of the PC purchased. Officials claim the firm sells to anyone from home users,

TPM checklist

1 Consider signing with only one TPM organisation, and ensure if possible that there is only one point of contact at the company.

2 Call the manufacturer of your equipment and ask who they have approved to provide maintenance. While each PC might be industry standard, it's better to have a TPM that carries a lot of spares for your equipment.

3 Find out the breakdown of charges for each TPM contract and ask if you can tailor a contract to suit your own particular needs.

4 Ask around about the TPM you will be dealing with. If possible, find someone who has already dealt with them and ask about their response times, their ability to source parts quickly and their desire to fulfil the contract once it's signed.

5 Consider how much extra you pay to gain a quicker response time. Determine how critical your equipment is and how long you can live without it, then tailor the contract to meet that timeframe.

6 Will the TPM offer you temporary replacement of your equipment if it can't solve the problem within its standard response time? If you're paying a premium for a four-hour response time, you don't want to be waiting 24 hours without equipment!

Warranty options

There is a plethora of maintenance contracts available, according to Mitsui's general manager of engineering, Colin Thompson. Following is a list of the options that are available from Mitsui, and these can be taken as a fair yardstick for what's available generally.

Warranty Conversion: A return-to-depot warranty, usually supplied by the manufacturer at the time of purchase, which can be converted to onsite service. There is an annual charge for each piece of equipment, but no additional charge during the validity of the original warranty period, as parts and onsite labour are included.

Comprehensive Maintenance Agreement: A fully comprehensive maintenance package that covers all parts, labour and travelling required to perform the repairs, and includes unlimited service calls for hardware failure, telephone support, and the services of a customer engineer and account manager.

Retainer Contract: This is a combination of the comprehensive agreement and a time and material contract. There is an annual charge per unit covered and each call out is charged at a set fee. All parts are supplied at 25 per cent less than recommended retail price. The benefits are a low initial monetary outlay, a set fee per service call, telephone support, an assigned customer engineer and a 30-day after repair warranty.

Ad Hoc Maintenance: Here the user is charged only for time and materials and has the benefit of an assigned engineer and account manager, free telephone support and a 30-day repair warranty.

students and small business users to the government and corporate markets. With 40 offices around Australia and a 008 telephone response centre, Osborne is geared to providing a wide range of support to its buyers.

"One of the key things we offer is the ability to perform a rolling upgrade," said a company spokesperson. "If someone buys a computer from us this year and decides later that they need a more powerful hard disk or motherboard, they don't have to trade in the product. We provide them with a new five-year warranty and keep rolling it on as they upgrade other parts.

"This allows our buyers to upgrade their computers without paying huge maintenance contracts. They need never pay another cent for maintenance."

IBM, too, is keen to provide support and maintenance itself, especially at the low end of the market where it sells its PS/1 range of PCs. Rather than rely on the technical talents of mass merchandise stores such as Harvey Norman Discount, Dick Smith, Brashs and Grace Brothers, IBM provides a 008 number as the first line of inquiry for its users when they are troubled.

Mark Phibbs, IBM's Personal Systems Division marketing manager, says, "Retailers just aren't interested in supporting that type of thing, because from a business point of view it doesn't make sense. They certainly can't make any money out of it and so can't provide as good a service [as IBM can]."

Part of IBM's maintenance strategy is to provide a one-year warranty with each PS/1. The warranty is limited to a 008 number and replacement via couriers paid for by IBM.

"The machines are designed so that it is easy for the user to take a part out and replace it with a new one," says Phibbs, who claims that 30 per cent of buyers probably use the hotline at least once, and often just in the early stages of a product's life cycle.

While 008 numbers allow for some problems to be fixed, ACL has initiated a new service which should capture a large part of the low end of the market. The company has been busy this past year setting up a cheap drive-in and fix it service, which lends itself well to direct buyers who don't want the hassle or the expense of buying a TPM contract.

ACL is attacking this market vigorously, introducing a number of ACL Quick Fix stores where you can drive in, drop off your PC and come back a few hours later to a, hopefully, operational PC.

ACL Quick Fix is tailored towards the retail end of the market and will eventually see shop front stores opening around Australia where customers can drive in and leave their machine.

"Customers want to know how much money they're up for when they get their machine fixed, so we give them a quote, and when they give us authorisation we get it fixed," Mader says.

While this sort of service usually requires a hefty volume to go through in order for it to be financially viable for the TPM, Mader claims that by riding on the back of ACL's existing facilities and using existing technicians (of which the company has more than 200), the service pays. Mader wants to expand this business and is already operating one in each of ACL's direct service centres around Australia.

"We open on Saturdays and are getting more in line with retail trading hours," he says, adding that it is perfect "for users who don't want to have a fixed contract with a TPM and just want to have their machine fixed, or have its memory, disk or motherboard upgraded."

Time

Regardless of the length of the warranty, perhaps the most important issue is response time. Who cares that *Two Bob Maintenance Pty Ltd* has sold you a 10-year warranty for a mere $20 when both Bobs are out when you need their help and won't be back until next May?

What happens if the company can't meet its obligations? What happens if your four-hour, guaranteed onsite service has turned into four days and waiting? Not much, it seems. As Bull's national marketing and business development manager Peter Mayne says, a number of customers build in penalty clauses, but they are usually large corporates with sizeable contracts, not small users.

If you want to form a close relationship with a TPM, then its probably best to match the size of your company with the company which will provide you with maintenance. If the likes of ACL and Bull are too intimidating, despite their best efforts to embrace smaller users, then consider using a local Ma and Pa type reseller.

If you feel more comfortable working with a dealer who's around the corner, rather than a TPM that straddles the country, make sure the dealer is up to scratch. Check out how long he has been in business, how many technical staff are there and, if you can, talk to someone who has bought equipment from the dealer and had it serviced by them.

For many, it's simply not worth the effort to enter into a TPM contract, but if you see your PC as critical, then talk to someone about an onsite contract.

"The type of contract you eventually go for depends on the criticality of your system," says Mayne. "If you regard your system as being mission critical, then take the most comprehensive maintenance you can get." ✍

Top maintenance providers

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Bull	(02) 847 7100
Datapoint	(02) 438 3811
Honeywell	(02) 690 9300
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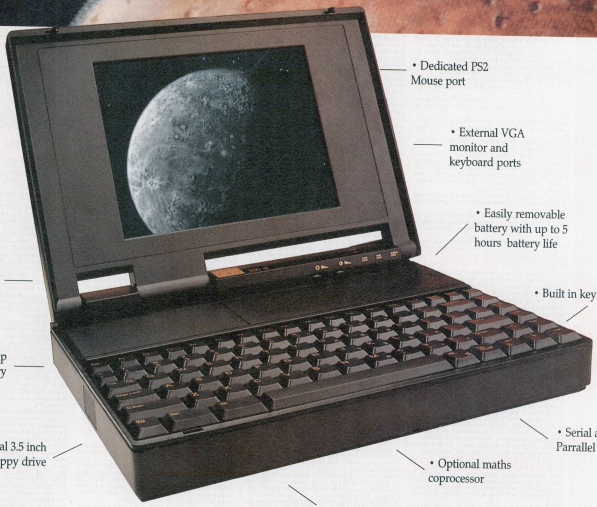
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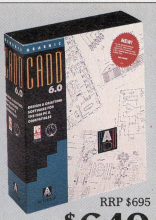
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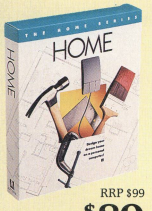
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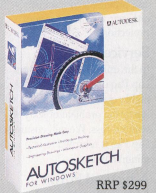
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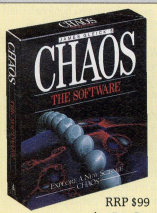


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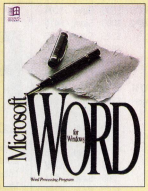
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MS C/C++ 7.0 with SDK (Win. 3.1)	**$555**	**Save**	**$18**
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MS DOS 5.0 Licence	$89	Save	$1
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Works 2.0 DOS or Windows	**$199**	**Save**	**$100**
OB Version 2.0 for Windows	**$395**	**Save**	**$100**
ton AntiVirus 2.0	$145	Save	$74
ton Commander 3.0	$170	Save	$65
ton Desktop 2.0 for Windows	$165	Save	$110
rton Desktop for DOS	**$125**		**Special**
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rton PC Anywhere 4.5 Both	$215	Save	$60
rton Utilities 6.01	$165	Save	$105
vell NetWare V1.1 Lite & DR DOS	$109		NEW
ject Vision 2.1 for Windows	**$179**		**NEW**
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Target (Win.) LTD OFFER!	**$170**	**Save**	**$429!**
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Turbo Pascal V1.5 for Windows	$255	Save	$95
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WordPerfect Works	$169	Save	$
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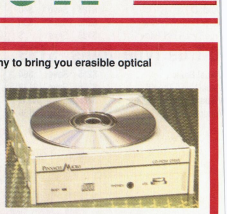
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Products shown in red are for MS Windows 3.1.

Software

Special and very strict conditions apply to all Academic and Education products — Phone for details.

Borland International

Borland C++ v3.1 ..... $487
Borland C++ v3.1 Educ. $220
Borland C++ v3.1 with Application Framework $725
Borland C++ with Application Framework Educ. $365
Paradox 4.0 ..... $822
Paradox 4.0 Educ. $280

Corel DRAW! Crossgrade — Direct Now From PC JUNCTION
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DataStorm Technology

Procomm Plus $135
Procomm Plus for Windows . $160

Lotus Development

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1-2-3 v3.1+ $599
1-2-3 v2.4 ..... $479

Microsoft

DOS 5 Upgrade $99
Excel v4 ..... $520
Scheduler Starter Kit $225
Publisher $210
Word for Windows v2 B $505
Word for Windows v2 Acad ... $284
Works for Windows $199

Symantec

Norton Desktop Windows ... $167
Norton Desktop DOS $149

WordPerfect Corp

WordPerfect 5.1 ..... $569
WordPerfect 5.1 Education . $215
WordPerfect 5.1 Win. $569
WordPerfect 5.1 Win. Educ. . $215

Miscellaneous Software

Direct Access v5 ..... $99
Fastback Plus v3 ..... $112
LapLink Pro $201
QA PLUS Windows v5 - Still The Very Best Diagnostic Tool . . $399
Winspeed Accelerator $139

Only While They Last — the incredible Hewlett Packard HP500C full colour A4 ink jet printer, now availabe in very small quantities at a clear out price. Strictly limited quantities at this price $1,149

Hardware

CD ROM Players

Goldstar Int. $499
U.S. Pinnacle Int. w/World Atlas $599

Unique to PC JUNCTION! — Corel Draw 3 Crossgrade + US manufactured CD ROM Player Bundle. This is the complete Corel v3 Edition with CD ROM disk. Conditions apply — Only While They Last $960

U.S. Pinnacle Int. w/Library . $690
U.S. Pinnacle Ext. w/World Atlas $875
Panasonic Int. SCSI w/ 5 disk library Library $899
Sony Int. AT/IDE — MPC Kit . $650
Soundblaster Pro MM Kit Int. CD ROM w/Library + SB Pro v2 Tremendous value $881
NEC Ext. SCSI w/6 disk Library $1,239

Fax Modems

Avtek In Plus 24 Internal $275
Banksia Blitzer 9600S/R Ext. . $359
Banksia V.32bis 9600S/R Ext. $897
Interlink Fax Modem 3 v.42bis Ext. $479
Interlink Fax Modem 3i - v.42bis Internal $439
Netcomm M7F V.32bis ... $1045
Netcomm Pocket Fax Modem external Class1 ..... $319

Disk Drives

Floppy drive 5.25" Teac $101
Floppy drive 3.5" Teac $92
WD 20mb Floptical drive ... $685
ALPS 105 mb 17ms $411
ALPS 215 mb 17ms $736
Benouilli Ext./Int/Twin and for Mac 90 mb New Series . Call for prices
Fujitsu 104mb $517
Fujitsu 330mb 12ms $1,759
Maxtor 213 mb 15ms $824
Western Dig 84 mb 17ms . .$385
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Plus Hardcard IIXL 105mb . . . $722
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The All NEW Bernoulli 90 PRO Series Removable Drive from Iomega:
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Ultima Underworld
* Wing Commander II
* 3-D Graphics
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ler — improve disk access up to100 times 1 mb cache Run 2 floppies and 4 hard drives. .$373

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Call for prices on PC JUNCTION'S hard disk installation kits — These include a Top Quality Super Fast Drive, an interface card, all cables, brackets, screws, installation disk and complete instructions.

While they last — Logitech Trackman Portable for Notebooks and Laptops. $150

Modems
Banksia BMX V.32 bis $759

Interlink FastBit IIbis V.32bis — tremendous value $659

Monitors
Compucon 14" SVGA MScan $442
EIZO 15" Low Rad. New Model
The Absolute Best. . . . . Call!
MAG 17" Low Rad. Sony Trinitron Whacko! $2550
Sony 17" Triniton Low Rad. All New. Opening special . . . . .Call!
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ViewSonic 6FS 15" VESA $1,045
ViewSonic 7 17" Low Rad. $2,299
ViewSonic 8 20" Low Radiation Bargain Flicker Free High Resolution. $2999

All New Award Winning Pro Audio Spectrum 16 bit MPC compatible Stereo Sound Card including



* Stereo waveform editor
* Midi sequencer
*Text to speech synthesiser
* Four track sampling
* 20 voice stereo synthesizer and much much more.
* AdLib and Soundblaster Compatible
Now While They Last . . $399

Sound Cards
Microsoft FogHorn New! . . . Call!
SoundBlaster Pro v2. . . . . .$345

Scanners
HP Scanjet 2C A4 Flatbed . . $3263

The All New Logitech "SCANMAN COLOR" hand held scanner, now in stock at PC JUNCTION. Not a "toy" or cheap unheard of brandname —but a professional full 24 bit colour scanner and software from Logitech. Logitech waited for technology to catch up, and now they've moved.
* "AutoStitch" software included to automatically join images — Easily scan A4.
* "FotoTouch" Colour Imaging software included.
* Works with all Windows



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* Logitech's NEW "CatchWord"Optical Character Recognition option available as an extra. Opening special from PC JUNCTION $1,189

New!!! Pro Audio Spectrum 16 Multi Media Upgrade System — 16 bit sound card, NEC Super Fast SCSI Multimedia CD ROM drive, Lotus 1-2-3 Multi Media, Comptons Multimedia Encyclopaedia, Kings Quest V, Nautilus Multi Media Magazine, MacroMind Action and more, all on CD ROM. The most complete multi media system you've seen. Now available from PC JUNCTION $1,799.00

Logitech Scanman 256 . . . .$525
Logitech Scanman + Perceive OCR $627
Logitech Scanman 24 bit Colour a Brand New Just Released . .$1189
Microtek 600G A4 256 Grey Scale $2,238
Microtek 600Z A4 24 bit Colour with Aldus PhotoStyler . . .$2,873

Tape Backup
Archive SCSI Ext. 250mb . $1,199
Benouilli 250mb QIC80 — only 1" high and optimized for Win 3.1
Call For Low Introductory Price!
Colorado Jumbo 120 Int. $366
Colorado Jumbo 250 Int. . . .$483
Colorado Jumbo 120 Ext. . .$555
Colorado Jumbo 250 Ext. . .$671
Colorado TRAKKER Portable . $688
Sony DAT 2.0 GB Int. Tape Drive Kit $2,646

Graphic Boards
ATI Graphics Vantage $510
ATI Graphics Ultra Accelerator includes MS comp. mouse . .$636
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All products despatched by overnight courier for $10. Some large software and hardware packages may be more. We quote at time of purchase.
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PC Super Market

Make ordering computer equipment and software easier and safer by using the specially designed *PC Super Market* Buyer's Template. Simply fill in the details of your system and the goods you intend to purchase. Send the form to the supplier to get written confirmation of availability, pricing, compatibility with your PC system, delivery and returns arrangements. Don't forget to register your purchase under the ACP Publishing Pty Ltd Buyer's Protection Scheme. (See page 18)

BUYER'S TEMPLATE

SUPPLIER DETAILS

Name _____
Company _____
Address _____
_____
_____
_____
_____
Postcode _____
Telephone _____
Fax _____

CUSTOMER DETAILS

Name _____
Company _____
Address _____
_____
_____
_____
_____
Postcode _____
Telephone _____
Fax _____

ORDER DETAILS

New order _____
Telephone confirmation _____
_____
Mailed _____
Faxed _____
Name of salesperson _____
_____
Date of order _____
Order number _____

Quantity	Detailed description of the items	Unit cost	Total price

SUB TOTAL	
DELIVERY	
PACKAGING	
SALES TAX	
GRAND TOTAL	

DELIVERY DETAILS

Method of delivery _____
Date of despatch _____ Date of delivery _____
Delivery address _____
_____
_____
_____ Postcode _____

SYSTEM COMPATIBILITY

My current system consists of the following:
Hardware _____
_____
Software _____
_____
Peripherals _____
_____
Please state details of your return policy, money back and warranty arrangements:
_____
_____
We confirm that the item(s) ordered is (are) compatible with the customer's current systems described above.

Supplier's signature _____

METHOD OF PAYMENT

Purchase Order • Cheque • Postal Order • Credit Card (Delete as applicable).

Credit card company _____
_____
Credit card number
|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
Expiry date _____
Signature _____

PC Super Market Buyer's Guide

The PC Super Market Buyer's Guide has been compiled to provide you with the technical product information needed to make an informed buying decision. This months Buyer's Guides include 386 desktop computers, monitors and graphics adaptors. Over 280 products are surveyed.

With this product information, we have included an overview of each of the product markets surveyed. This overview may contain general information on the market, what to look for when purchasing a product in the range and an explanation of the terms used in the table. To maximise the amount of information that can be included in the tables, we have used icons or abbreviations to portray information. A key describing each icon or abbreviation is provided at the bottom of each page of each table.

Besides the product comparison tables, the PC Super Market Buyer's Guide also contains value added features that will help you to make the right purchasing decisions.

The PC Super Market Buyer's Advisory Service can be found on page 54. The Advisory Service provides you with an independent guide to selecting PC hardware and software. By filling out the questionnaire provided and for a fee of $25, you will receive personalised, written advice from an independent consultant on the type of hardware and software to buy.

On the page opposite, you will find the PC Super Market Buyer's Template. This form has been designed to list all the information needed by both you and the supplier to proceed with a purchase.

Attention suppliers

The information contained in the following Buyer's Guide is provided by the manufacturer or the master Australian distributor of the product in Australia. We will only publish information received from these companies. If you are the manufacturer or the master Australian distributor of products that fall into one of the categories listed in the proposed schedule, please ensure that we have up to date information by sending updates or press releases to Helen Summers, PC Super Market, PO Box 37, Sydney 2001 or telephone (02) 288 9122. We are limiting the range to PC product based around the Intel xxx86 and compatible based chips.

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Monitors ..... Page 59
Graphics Adaptors ..... Page 62

Methodology

To obtain information for the Buyer's Guide, a database of PC products and suppliers is maintained. From this database, surveys are sent to companies who distribute or manufacture the relevant product ranges in Australia. Only returned and completed information is published.

All the information published in this section has been confirmed as correct. However, pricing, models, specifications and contact information can change. We advise that you confirm any information contained in the tables, specifically price, before making a buying decision. All pricing information contained in the table is recommended retail pricing including tax.

Schedule

In the following months, PC Super Market will be publishing Buyer's Guide tables on the following products:
(Please note that the Buyer's Guide scheduled for this issue on databases has been postponed to next month.)

December

- Notebooks
- Laptops
- Laser Printers
- Modems
- Databases
- Word Processors

January

- 486 Computers
- Dot Matrix Printers
- Tape Drives
- Spreadsheets
- Third Party Maintenance Providers

PC Super Market

NOVEMBER 1992

The PC Super Market Buyer's Advisory Service offers an independent guide to selecting PC hardware and software. Based on your needs, and drawing on a database of all available PC products, you will receive personalised, written advice on what sort of hardware and software to buy within 48 hours of receipt of this questionnaire. The service costs $25, and some advertisers may deduct that from the price of their goods.

PC Supermarket Buyers Questionnaire

1) Please indicate what you need or would like to use your computer for.
1 = essential 2 = maybe later 3 = not important

a)Word processing 1 2 3
Use your computer to create letters and other documents. A word processor can also function as a simple database.

b) Financial calculations 1 2 3
The spreadsheet is a powerful tool in answering 'what if' questions about numerical data. Spreadsheets can help you budget and plan finances.

c) Record keeping 1 2 3
Databases help keep track of information from names and addresses to customers to record collections. Their power lies in their indexing capabilities.

d) Personal organisation 1 2 3
A computer can act as a diary, address book, calculator and note writer, using personal information management software.

e) Book keeping 1 2 3
Computerised accounts clear the paper mountain and make light work of small business management.

f) Entertainment 1 2 3
Games, games, games, for the whole family.

g) Education 1 2 3
Educational software can complement school and is more exciting than textbooks.

h) Programming 1 2 3
Learning to program is challenging and can be rewarding.

i) Graphics 1 2 3
Become an electronic artist. The computer can produce marvellous effects, but think of how you are going to produce hard copy.

j) Computer aided design 1 2 3
The computer can be a valuable aid in drawing plans, designing products and creating line drawings.

k) Music 1 2 3
Computers can control a range of instruments, as well as being the electronic equivalent of manual composing.

l) Desktop publishing and presentation 1 2 3
The next step beyond word processing, where text meets pictures. DTP can also be used for computer-generated slide shows and business graphics.

m) Communications 1 2 3
With a modem, your computer can communicate with others over the telephone. You can 'talk' to other enthusiasts and download programs.

2) Have you ever used or owned a computer before? ..... Yes No

2a) If yes, what previous experience have you had or what computer do you own? .....

.....

.....

3) Do you want to run several tasks at once? ..... Yes No
Normally you would load programs as you need them

4) What is the maximum you can afford to spend? ..... $

5) Do you want to include software in that price? ..... Yes No

6) Do you want to include peripherals in that price? ..... Yes No

7) Would you prefer a 'name' brands, regardless of value for money? Yes No

8) Is buying Australian important to you? ..... Yes No

9) Is portability important to you? ..... Yes No

10) Will this computer be part of a network? ..... Yes No

11) If not, will you share information with other computer users? .. Yes No

12) Any other information you would like considered?

.....

.....

.....

.....

Mr/Mrs/Ms .....

Address .....

.....

Suburb ..... Postcode .....

I agree that your advise is given without legal liability for any consequences arising therefrom.

(signature)

Send your completed form to *PC Super Market* Buyer's Advisory Service, PO Box 37, Sydney 2001 with a cheque for $25 made payable to Point Partners.

386SX COMPUTERS

The 386SX can be considered a hybrid computer in that it has the same 16-bit bus as an AT computer, but a 32-bit processor. It can process programs written specifically for the 386 and handle add-in boards for the AT. Although Windows can run on an AT, the 386SX is regarded by many as the minimum PC hardware which is needed for Windows applications. We have only listed configurations where the speed of the processor changes. The machines listed below may come in various configurations with hard disk capacity, monitor or memory being optional.

Things to look for

Speed — Obviously a consideration in buying any processor, the 386SX-based machines run at 16, 20, 25 and 33MHz.

Expansion — Check the expansion capabilities of the machine both with the number of free expansion slots and also if there are free disk bays available for more disk drives. The bus type will be important especially if you are upgrading to a 386SX from an AT and want to use the add-in boards from the AT. Also look for the hard disk controller and a graphics adaptor to be on the motherboard, thus saving the expense of purchasing these boards and freeing expansion slots.

Upgrades — Some machines are now (processor) chip upgradable to a higher processor.

Warranty — The length and type of warranty differs significantly between distributors. It may be possible to upgrade from a return to base type warranty to an onsite warranty.

Explanation of terms

Desktop or tower — This is a description of the actual physical aspect of the unit. If desk space is a consideration, a tower system or a slimline desktop may be appropiate.

Maximum RAM on motherboard — This refers to the maximum amount of memory that can be populated directly on the motherboard without the use of an add-in board.

Number of expansion slots — The total number of expansion slots provided in the machine — not the available number of slots. The number in the square brackets refers to the type of slot, ie 8, 16 or 32 bits. You should also refer to the bus type/architecture question earlier in the table.

Bundled items — Software and hardware sold with the computer. You should definitely check that these items are still part of the system as the bundling of software may be part of a limited promotional special offer.

Warranty — Only a comprehensive (parts and labour) warranty period has been stated. Some distributors have a longer warranty on the labour component.

Warranty type — The main types of warranty are onsite and return to base. With onsite warranty, there is normally a guaranteed service time — normally with PCs it is eight hours. Return to base warranty refers to sending the machine to the service depot of the manufacturer, dealer or service agent. Where this is known we have specified to whom to send it. With return to base warranty, normally all freight charges are the customer's responsibility.

Name	Distributor	Manufacturer	CPU speed(MHz)	Desktop or Tower	Bus type	Standard RAM on mother board in configuration (Mb)	Maximum RAM on motherboard(Mb)	Monitor in base configuration	Hard disk (Mb) in base configuration	Number of parallel ports	Number of serial ports	Number/type of expansion slots	Bundled items	Warranty	Warranty type	Recommended retail price (including tax)	Phone number
AcerPower 386SX	Acer	Acer	25	D	I	2	16	U	0	1	2	4	W 3.1, D 5.0, mouse	12 months	B	$1898	(02) 418 8044
AGI 3000B	Multisource	AGI	20	D	I	2	8	0	0	1	1	8	None	12 months	B	$1800	(02) 955 8100
AIS 386SX/2D	AI Systems	AI Systems	33	Either	I	4	32	S	125	1	2	8	Novell, DD 6.0	3 years	D	$1990	(03) 579 0244
Alpha 386SX	New Concept	New Concept	25	D	I	2	8	None	0	1	2	7[16]	None	12 months	D	$600	(03) 388 0087
Amstrad PC4386SX	Amstrad	Amstrad	20	D	I	4	16	V c	80	1	1	2	Amstrad Manager, W 3.0, D 3.3, Excel 2.1p, mouse	12 months	B, S	$1999	(02) 316 5289
Amstrad PC5386SX	Amstrad	Amstrad	20	D	I	1	4	V c	40	1	1	2[16]	D 3.3, Counterpoint, mouse	12 months	B, S	$2499	(02) 316 5289
Amstrad PC7386SX	Amstrad	Amstrad	25	D	I	1	16	S c	40	1	2	2[16]	Amstrad Front End, Counterpoint, Lotus Works, D 5.0, mouse	12 months	B, S	$1999	(02) 316 5289
Apricot LS 386SX-16-e	Apricot	Apricot	16	D	I	1	8	None	0	1	2	None	D 5.0, Q Basic, Ethernet adapter	12 months	B	$1736	(02) 888 9444
Apricot LS 386SX-16/UTP	Apricot	Apricot	16	D	I	1	8	None	0	1	2	None	D 5.0, Q Basic, UTP adapter	12 months	B	$1814	(02) 888 9444
Apricot LS 386SX-20-e	Apricot	Apricot	20	D	I	2	8	None	0	1	2	None	D 5.0, Q Basic, Ethernet adapter	12 months	B	$1957	(02) 888 9444
Apricot LS 386SX-20-TR	Apricot	Apricot	20	D	I	2	8	None	0	1	2	None	D 5.0, Q Basic, Token ring adapter	12 months	B	$2730	(02) 888 9444
Apricot LS 386SX-20-UTP	Apricot	Apricot	20	D	I	2	8	None	0	1	2	None	D 5.0, Q Basic, UTP adapter	12 months	B	$2034	(02) 888 9444
Apricot Xen-LS 386SX-20	Apricot	Apricot	20	D	I	2	8	None	0	1	2	3[16]	D 5.0, Q Basic	12 months	B	$2596	(02) 888 9444
Apricot Xen-LS 386SX-20-e	Apricot	Apricot	20	D	I	2	8	None	0	1	2	3[16]	D 5.0 Q Basic	12 months	B	$2759	(02) 888 9444
Arrow 386SX-16	All Data	Arrow	33	Either	I	1	16	S c	85	1	2	2 [8], 4[16]	None	5 years	2 y O, 3 y B	$2497	(03) 794 5799
ASI 386SX-25	Anabelle Bits	Anabelle Bits	25	D	I	1	16	S	43	1	2	6[16]	D, W, mouse	2 years	B	$2000	(02) 313 6155
ASI/AMI 386SX-20	Anabelle Bits	Anabelle Bits	20	D	I	1	32	S	32	1	2	6[16]	D, W, mouse	2 years	B	$2520	(02) 313 6155
AST Power Premium 3/25S	AST	AST	25	D	E	2	16	None	0	1	2	6 E	None	12 months	B	$3120	(02) 415 5400
AT-6000-SX-25	Accord	Accord	25	D	I	2	8	V	212	1	2	8	None	12 months	D	$2426	(07) 376 2955

KEY

Desktop - D Tower - T Bus type: I - ISA (AT), E - EISA, M - MCA

Monitor in configuration: V - VGA, S - SVGA, U - UVGA m - mono, c - colour

Number/type of expansion slots: [8]- 8 bit slot, [16]- 16 bit slot, e.g. 6[16] means 6 by 16 bit slots Bundled items: [W] - Windows, [D] - DOS, DD - DR DOS

Warranty type: O - onsite, M - return to manufacturer, D - return to dealer, S - return to service agent, B - return to base (the base was not specified).

386SX COMPUTERS

Name	Distributor	Manufacturer	CPU speed(MHz)	Desktop or Tower	Bus type	Standard RAM on mother board in configuration (M)	Maximum RAM on motherboard(M)	Monitor in base configuration	Hard disk (M) in base configuration	Number of parallel ports	Number of serial ports	Number/type of expansion slots	Bundled items	Warranty	Warranty type	Recommended retail price (including tax)	Phone number
Austin 325	Hartland	Hartland	25	D	I	2	8	S	80	1	2	5 [16], 2 [8]	D, Agiler mouse and mat	12 months	B	$2095	(02) 313 4133
Avo 386SX	Avo	Avo	33	Either	I	2	16	S c	80	2	1	1 [8], 5[16]	None	12 months parts, 2 years labour	B	$1499	(02) 906 2655
Bravo 3/33S	AST	AST	25	D	I	4	16	S	80	1	2	4	MS PS/2 Mouse, W 3.1	12 months	B	$3192	(02) 415 5400
BWC-386SX/20 Desktop	Bull HN	Bull HN	20	D	I	2	8	None	52	1	2	8	None	12 months	M	$2321	(02) 847 7100
Byte-Pro	Byte Power	Byte-Pro	33	T	I	2	16	S	60	1	2	5 [16], 0 [8]	None	12 months	D	$1650	(07) 862 1874
Club Eagle 386SX/25	CLUB American	CLUB American	25	D	I	2	16	None	0	1	2	3[16]	D 5.0	2 years	B	$1320	(02) 955 6864
Commodore 386SX-25	Commodore	Commodore	20	D	I	3	16	S	80	1	2	5 [16]	W, mouse	12 months	S	$2499	(02) 428 7777
Commodore SL 386SX-16	Commodore	Commodore	16	D	I	1	5	V c	40	1	2	3 [16], 2 [8]	W, mouse	12 months	S	$1999	(02) 428 7777
Compaq Deskpro 386s/20N	Compaq	Compaq	20	D	I	2	16	V	60	1	1	2	None	12 months	B	$3059	(02) 911 1999
DECpc 325SX LP	DEC	DEC	25	D	I	2	32	S c	52	1	2	3[16]	W 3.1, D 5.0, mouse	12 months	O	$2868	(02) 561 5252
Deskmaster 386S/25	Samsung	Samsung	25	D	I	2	12	S	60	1	1	3	W 3.1	12 months	D	$1995	(02) 638 5200
Discware 386SX	Discware	Discware	25	D	I	4	32	S	120	1	2	8	D, W, mouse	2 years	B	$1490	(02) 310 1144
Elite 386SX25D	Elite Industries	Elite	25	T	I	2	8	V	40	1	2		D	12 months	D	$1750	(02) 898 0222
Everex Step 386is	Multisource	Everex	16	D	I	1	4	V	0	1	1	8	Mouse, W 3.0, D	12 months	B	$2280	(02) 955 8100
Everex Step 386SX-20	Multisource	Everex	20	D	I	2	16	0	0	1	2	8	W 3.0, mouse, D	12 months	B	$2520	(02) 955 8100
Hewlett-Packard Vectra 386s/25	Hewlett-Packard	Hewlett-Packard	25	D	I	4	16	None	0	1	2	3	None	12 months	O	$2932	(03) 272 2895
HP Vectra 386/25N Model 1	Hewlett-Packard	Hewlett-Packard	25	D	I	4	16	None	0	1	2	3	W, mouse, D 5.0	12 months	O	$1790	(03) 272 2895
Hypec 386SX-33	Hypec	Octek	25	T	I	2	16	V c	80	1	2	6 [16]	D	2 years	D	$1980	(02) 808 3666
InterTAN ADT-381	Intertan	Tandy	25	D	I	2	16	S	85	1	1	3 [16]	D 5.0	12 months	D	$2498	(02) 875 1222
IPC Dynasty LE 386SX-25V/40	IPC	IPC	25	D	I	2	16	V c	40	1	2	4 [16]	DD	12 months	B	$2550	(02) 809 6005
IPC Dynasty LE/SX	IPC	IPC	25	D	I	2	16	V m	0	1	2	4[16]	DD 6.0	12 months parts, lifetime labour	D	$1795	(02) 809 6005
IPC Uno-S eries SX20V/40	IPC	IPC	20	D	I	1	8	S c	40	1	2	4[16]	DD 6.0	12 months parts, lifetime labour	D	$2095	(02) 809 6005
IPS 386SX-33MHz	Intelligent Printing Systems	Intelligent Printing Systems	33	Either	I	4	16	S	85	1	2	6[16]	D 5.0, W 3.1, serial mouse	12 months	D	$1995	(02) 906 7655
Kambrook Benchmark 386SX	Kambrook	Kambrook	33	D	I	2	20	Vc	0	1	2	4[16]	D 5.0	2 years	M, D	$1954	(03) 543 2200
Microscience 80386 25M	Microscience	Total Peripherals	25	D	I	4	16	S	0	1	2	7	None	3 years	B	$2050	(03) 699 6877
Miden 386SX 25MHz	Miden	Eagle	25	Either	I	2	16	S c	40	1	2	4[16]	Mouse, mouse pad	12 months	D	$2190	(03) 321 0000
Miden 386SX 33MHz	Miden	Eagle	33	Either	I	2	16	S c	40	1	2	4[16]	Mouse, mouse pad	12 months	D	$2325	(03) 321 0000
NEC PowerMate SX/16i	NEC	NEC	16	D	I	2	26	S	45	1	1	4	D 5.0	3 years	M, D, S	$2450	(02) 930 2000
NEC PowerMate SX/20i	NEC	NEC	20	D	I	2	26	S c	60	1	1	4	D 5.0	3 years	M, D, S	$3280	(02) 930 2000
NEC PowerMate SX/25i	NEC	NEC	25	D	I	2	26	S	60	1	1	4	D 5.0	3 years	M, D, S	$3280	(02) 930 2000
Olivetti M300-15	Olivetti	Olivetti	25	D	I	4	16	S	85	1	1	4	D 5, W 3.1	12 months	B	$3150	(02) 748 2600
Olivetti M300-25	Olivetti	Olivetti	20	D	M	2	16	S	60	1	1	3	D 5, W 3.1	12 months	B	$4025	(02) 748 2600
Olivetti PCS 386SX	Olivetti	Olivetti	16	D	I	1	8	V	40	1	1	2 [16], 1 [8]	D	12 months	B	$1490	(02) 748 2600
Optima OCT-386 SX/33	Optima	Optima	33	Either	I	2	16	S	105	1	2	8[16]	Manual	2 years	B	$1900	(02) 638 1222
Orbit 386 SX	Computer Electronics	Computer Electronics	25	Either	I	2	16	S	52	1	2	8	None	2 years	D	$1728	(02) 417 8355
PRISM 386SX-33	Ipex	Ipex	33	Either	I	2	16	S	100	1	2	5	D 5.0	3 years	B	$2900	(03) 242 5000
Sensor SP386SX	Samsung	Samsung	16	D	I	2	8	None	40	1	1	2	W 3, mouse, Nortons, tutorial software, tutorial video	12 months	D	$2199	(02) 638 5200
Wysepc Model 3016SX	Wyse	Wyse	20	D	I	1	16	None	40	1	2	6 [16], 2 [8]	D	12 months	B	$1810	(02) 888 7455
Z-Station 325 Sh	Zenith	Zenith	25	I	I	4	16	S	80	1	1	4[16]	D 5.0, W 3.1, mouse, NetWare, Banyan Vines, LAN Manager System Network client shells	12 months	B	$4050	(02) 847 7199
Z-Station 325 Sn	Zenith	Zenith	25	I	I	4	16	S	80	1	1	2[16]	D 5.0, W 3.1, Network client shells	12 months	B	$3429	(02) 847 7199

KEY

Desktop - D Tower - T Bus type: I - ISA (AT), E - EISA, M - MCA Monitor in configuration: V - VGA, S - SVGA, U - UVGA m - mono, c - colour

Number/type of expansion slots: [8]- 8 bit slot, [16]- 16 bit slot, e.g. 6[16] means 6 by 16 bit slots Bundled items: [W] - Windows, [D] - DOS, DD - DR DOS

Warranty type: O - onsite, M - return to manufacturer, D - return to dealer, S - return to service agent, B - return to base (the base was not specified).

The table below describes various attributes of 386DX-based computers available in Australia today. The 386DX machines have a 32-bit data bus (the 386SX has a 16-bit bus) and can transfer data to and from the memory faster. They are also more powerful than a 386SX-based machine in that they also can run at a greater clock speed. We have only listed configurations where the speed of the processor changes. The machines listed below may come in various configurations with hard disk capacity, monitor or memory being optional.

Things to look for

Speed — Obviously a consideration in buying any processor, the 386DX-based machines run at 20, 25, 33 and 40MHz.

Expansion — Check the expansion capabilities of the machine with the number of free expansion slots and also if there are free disk bays available for more disk drives. Look for machines that have the hard disk controller and graphics adaptor on the motherboard, thus saving expense and expansion slots.

Upgrades — Some machines now are (processor) chip upgradable to a higher processor.

Warranty — The length and type of warranty differs significantly between distributors. Also, there are options available offered by distributors which are not listed due to the space restrictions of the table. It may be possible to upgrade from a return-to-base type warranty to an onsite warranty. If you are using this machine as a file server, then onsite warranty and service become important factors.

Explanation of terms

Desktop or tower — This is a description of the actual physical aspect of the unit. If desk space is a consideration, a tower system or a slimline desktop may be appropiate.

Maximum RAM on motherboard — This refers to the maximum amount of memory that can be populated directly on the motherboard without the use of an add-in board.

Number of expansion slots — The total number of expansion slots provided in the machine — not the available number of slots. The number in the square brackets refers to the type of slot, ie 8, 16 or 32 bits. You should also refer to the bus type/architecture question earlier in the table.

Bundled items — This refers to software and hardware sold with the computer at no extra cost. You should definitely check that these items are still part of the system as the bundling of software may be part of a limited promotional special offer.

Warranty — Only a comprehensive (parts and labour) warranty period has been stated. Some distributors have a longer warranty on the labour component.

Warranty type — The main types of warranty are onsite and return to base. With onsite warranty, there is normally a guaranteed service time — normally with PCs it is eight hours. Return to base warranty refers to sending the machine to the service depot of the manufacturer, dealer or service agent. Where this is known we have specified to whom to send it to. With return to base warranty, normally all freight charges are the customer's responsibility.

Name	Distributor	Manufacturer	CPU speed(MHz)	Desktop or Tower	Bus type	Standard RAM on motherboard in configuration(MB)	Maximum RAM on motherboard(M)	Monitor in base configuration	Standard RAM cache size(K)	Hard disk (M) in base configuration	Number of parallel ports	Number of serial ports	Number/type of expansion slots	Bundled items	Warranty	Warranty type	Recommended retail price (including tax)	Phone number
AGI 25 T & D	Multisource	Everex Systems	25	Either	I	4	8	None	64	0	1	1	8	None	12 months	B	From $2400	(02) 955 8100
Alpha 386/40	New Concept	New Concept	40	D	I	4	32	None	64	0	1	2	6[16]	None	12 months	D	$850	(03) 388 0087
Arrow 386DX-33	All Data	Arrow	33	Either	I	1	32	S	64	85	1	2	1[8], 6[16]	None	5 years	2 y 0, 3 y B	$2705	(03) 794 5799
Arrow 386DX-40	All Data	Arrow	40	Either	I	1	32	S	64	85	1	2	1[8], 6[16]	None	5 years	2 y 0, 3 y B	$2847	(03) 794 5799
ASI 386DX-40	Anabelle Bits	Anabelle Bits	40	D	I	4	32	S	64	256	1	2	2[8], 6[16]	D, W, mouse	2 years	B	$2495	(02) 313 6155
ASI/AMI 386DX-33	Anabelle Bits	Anabelle Bits	33	D	I	4	32	S	64	43	1	2	6[16]	D, W, mouse	2 years	B	$2535	(02) 313 6155
ASI/AMI 386DX-40	Anabelle Bits	Anabelle Bits	40	D	I	4	32	S	64	43	1	2	6[16]	D, W, mouse	2 years	B	$3020	(02) 313 6155
AST Power Premium 3/33	AST	AST	33	D	E	4	80	None	16	0	1	2	6 E	None	12 months	B	$4320	(02) 415 5400
AT-9000-40-C64	Accord	Accord	40	D	I	4	32	V	64	212	1	2	8	None	12 months	D	$2700	(07) 376 2955
AT-9000-50-C256	Accord	Accord	50	D	I	4	32	V	256	212	1	2	8	None	12 months	D	$4211	(07) 376 2955
Athena 386B	EPD	Athena	25	Either	I	2	32	S	0	40	1	2	8	Mouse, D D 6.00	12 months	B	N/S	(075) 30 2224
Athena 386C	EPD	Athena	33	Either	I	4	64	S	64	130	1	2	8	Mouse, D D 6.0	12 months	B	N/S	(075) 30 2224
Atronics 386-33	Atronics	Atronics	33	D	I	4	32	S	256	120	1	2	8[16]	D-5, WG.1, mouse	12 months	O	$2195	(03) 534 0708
Atronics 486	Atronics	Atronics	40	T	I, E	16	64	S	256	210	1	2	8[16]	D-5, WG.1, mouse	12 months	O	$3015	(03) 534 0708
Auslin 340D	Hartland	Hartland	40	D	I	4	32	S	64	130	1	2	6[16], 2[8]	D, Agiler Mouse and mat	12 months	B	$2590	(02) 313 4133
AVO 386DX-40 Cache	Avo	Avo	40	Either	I	4	32	S c	64	120	1	2	1[8], 7[16]	Mouse	12 months	B	$1890	(02) 906 2655
BWC-386/33 D	Bull HN	Bull HN	33	D	I	4	32	None	64	105	1	2	8	None	12 months	B	$2770	(02) 847 7100

KEY

Desktop - D Tower - T Bus type: I - ISA (AT), E - EISA, M - MCA Monitor in configuration: V - VGA, S - SVGA, U - UVGA m - mono, c - colour

Number/type of expansion slots: [8] - 8 bit slot, [16] - 16 bit slot, e.g. 6[16] means 6 by 16 bit slots Bundled items: [W] - Windows, [D] - DOS, DD - DR DOS

Warranty type: O - onsite, M - return to manufacturer, D - return to dealer, S - return to service agent, B - return to base (the base was not specified).

386 COMPUTERS

Name	Distributor	Manufacturer	CPU speed(MHz)	Desktop or Tower	Bus type	Standard RAM on motherboard in configuration (M)	Maximum RAM on motherboard(M)	Monitor in base configuration(	Standard RAM cache size(K)	Hard disk (M) in base configuration	Number of parallel ports	Number of serial ports	Number/type of expansion slots	Bundled items	Warranty	Warranty type	Recommended retail price (including tax)	Phone number
BWC-386/33 T	Bull HN	Bull HN	33	T	I	4	32	None	64	240	1	2	8	None	12 months	M	$4581	(02) 847 7100
CLUB Falcon 386/25	CLUB American	CLUB American	25	D	I	4	64	None	64	0	1	2	7[16] I, 1[32] (proprietary)	D 5.0	2 years	S	$2590	(02) 955 6864
CLUB Falcon 386/33	CLUB American	CLUB American	33	D	I	4	64	None	64	0	1	3	7[16] I, 1[32] (proprietary)	D 5.0	2 years	S	$2658	(02) 955 6864
CLUB Falcon 386/40	CLUB American	CLUB American	40	D	I	4	64	None	64	0	1	2	7[16] I, 1[32] (proprietary)	D 5.0	2 years	S	$2857	(02) 955 6864
Commodore DT 386DX-25NC	Commodore	Commodore	33	D	I	4	32	V	64	120	1	2	7[16]	None	12 months	S	$3999	(02) 428 7777
Compaq Deskpro 3/25i	Compaq	Compaq	25	D	I	4	32	None	16	84	1	1	3 I	D 5.0	12 months	D	$3186	(02) 911 1999
Compaq Deskpro 3/33i	Compaq	Compaq	33	D	I	4	32	None	16	84	1	1	3 I	D 5.0	12 months	D	$3414	(02) 911 1999
Compaq Deskpro 386/25M	Compaq	Compaq	25	D	I	4	64	None	16	60	1	2	4 E	D 5.0	12 months	D	$4212	(02) 911 1999
Compaq Deskpro 386/33M	Compaq	Compaq	25	D	E	4	64	None	16	60	1	2	4 E	D 5.0	12 months	D	$4440	(02) 911 1999
Compaq SystemPro 386	Compaq	Compaq	33	T	E	8	256	None	64	240	1	2	7	None	12 months	D	$16,524	(02) 911 1999
Compaq SystemPro/LT 386/25	Compaq	Compaq	25	T	E	4	128	None	16	120	1	2	T	None	12 months	D	$7746	(02) 911 1999
Compaq SystemPro/LT 386/33	Compaq	Compaq	33	T	E	8	128	None	16	210	1	2	T	None	12 months	D	$9342	(02) 911 1999
DECpc 340DX	DEC	DEC	40	D	I	4	64	S	128	52	1	2	3[16]	W3.1, Mouse, D 5.0	12 months	O	$3848	(02) 561 5252
Discware 386-33	Discware	Discware	33	D	I	4	64	S	64	180	1	2	8	OS/2, Mouse	2 years		$1790	(02) 310 1144
Discware 486-33	Discware	Discware	33	D	I	8	32	S	256	200	1	2	6[16], 2[8]	Mouse, OS/2	2 years	B	$2550	(02) 310 1144
Discware 486-50	Discware	Discware	50	T	I	8	32	S	256	200	1	2	6[16], 2[8]	Mouse, OS/2	2 years	B	$2950	(02) 310 1144
Everex Step 386/25	Multisource	Everex	25	D	I	1	8	None	64	0	1	2	8	Mouse , W.3.0, D	12 months	B	$3640	(02) 955 8100
Everex Step 386/33	Multisource	Everex	33	Either	I	4	64	None	128	0	1	2	2[8], 6[16]	Mouse, W.3.0, D	12 months	B	$4200	(02) 955 8100
Hypec 386-40	Hypec	Octek	40	T	I	4	32	S c	64	80	1	2	6[16]	D	2 years	D	$2135	(02) 808 3666
IPS 386DX-40MHz	Intelligent Printing Systems	Intelligent Printing Systems	33	T	I	4	32	S	64	80	1	2	1[8], 7[16]	D 5.0, W3.1, Serial Mouse	12 months	M	$2145	(02) 906 7655
Kambrook Benchmark 386/25	Kambrook	Kambrook	25	Either	I	4	8	V c	0	0	1	2	5[16], 2[8]	D 5.0	2 years	M, D	$2344	(03) 543 2200
Kambrook Benchmark 386/33 D	Kambrook	Kambrook	33	Either	I	4	32	V c	64	0	1	2	6[16], 1[8]	D 5.0	2 years	M, D	$2771	(03) 543 2200
Kompass 386-33G	Elite	Elite	40	D		1	8	None	64	100	1	2	8	None	12 months	D	From $2705	(02) 898 0222
Microscience 80386 40M	Microscience	Total Peripherals	40	D	I	4	32	S	64	130	1	2	8	None	3 years	B	$2150	(03) 699 8877
NEC PowerMate 386/33i	NEC	NEC	33	D	I	4	64	S c	32	60	1	1	4	D 5.0	3 years	S, D	$4356	(02) 930 2000
Olivetti M380-40	Olivetti	Olivetti	33	D	I	4	52	S	64	120	1	1	4	D 5, W3.1	12 months	B	$4640	(02) 748 2600
Orbit 40 - C64	Computer Electronics	Computer Electronics	40	Either	I	4	32	S	64	52	1	2	8	None	2 years	D	$2035	(02) 417 8355
Preditor 2 Series 386/486 Series	Compwell	Compwell	16-50	Either	I	4	32	S c	128	120	1	2	3[16] I	Mouse, D 5.0, W3.1	3 years	S	$2600	(02) 569 3700
Preditor S Series 386/486 Series	Compwell	Compwell	16-50	Either	I	4	32	S c	128	120	1	2	8[16] I	Mouse, D, 5.0, W 3.1	3 years	S	$2400	(02) 569 3700
PRISM 386DX-40	Ipex	Ipex	40	T	I	4	32	S	64	100	1	2	5	D 5.0	3 years	B	$3330	(03) 242 5000
Protech 80386-40C	Protech	Protech	40	T	I	4	32	None	128	0	1	2	8	None	3 years		$3552	(02) 957 4345
Supercom 386	Magic Computers	Magic Computers	33	D	I	2	32	S c	128	105	1	2	2[8], 6[16]	D 5.0. W 3.1, Serial mouse	3 years	M	$2350	(02) 212 3994
Supercom 386SX	Magic Computers	Magic Computers	25	D	I	1	16	S c		40	1	2	2[8], 4[16]	D 5.0. W 3.1, Serial mouse	3 years	M	$1949	(02) 212 3994
TP386-40C	Total Peripherals	Total Peripherals	40	D	I	4	16	S	64	130	1	2	6[16], 2[8]	D, W, Norton Anti-Virus, Norton Desktop for Window, Just Write	3 years	B	$2569	(02) 417 7455
Webster 386DX	Webster	Informtech	40	Either	I	4	32	S c	128	89	1	2	6[16] I, 2[8] I	Mouse, D V5.0, Mat	12 months	B	$1992	(03) 764 1100
Wyse Decision 386/40	Wyse	Wyse	40	D	I	4	64	0	128	40	1	2	6[16],2[8]	D 5.0	12 months	B	$3401	(02) 888 7455

KEY

Desktop - D Tower - T Bus type: I - ISA (AT), E - EISA, M - MCA Monitor in configuration: V - VGA, S - SVGA, U - UVGA m - mono, c - colour

Number/type of expansion slots: [8] - 8 bit slot, [16] - 16 bit slot. e.g. 6[16] means 6 by 16 bit slots Bundled items: [W] - Windows, [D] - DOS, DD – DR DOS

Warranty type: O - onsite, M - return to manufacturer, D - return to dealer, S - return to service agent, B - return to base (the base was not specified).

Personal computers display their output to a monitor via a video signal. Probably more than any other device, monitors have changed because of the demands of popular application software. One only needs to look at the impact of Windows, desktop publishing and CAD applications to appreciate the need for the higher resolutions now available. Although Windows and other applications will run on EGA, the cost and performance of VGA monitors almost dictates that this is the standard for the user who will run multiple applications and needs graphics.

What to look for

Screen size — Most screens are now at least 12in with probably 14in screens being the norm. (As a rule of thumb, the more intricate the work, the larger the screen size should be.)

Multiscan — Also called variable scan and multisync, these monitors can recognise different display formats and manage to display information correctly regardless of the standard required.

Interlaced and non-interlaced — This refers to the way the screen refreshes. Interlaced screens refresh every second line, non-interlaced every line at a time. This attribute is important in achieving a flicker-free screen. Other factors in achieving this include the scan frequency, resolution and the phoshor persistance. There are various standards concerning this flicker free debate, the most notable being the VESA standard.

Explanation of terms

Dot pitch — The distance between the dots on the screen. The more dots packed onto the screen, the finer the graphics can be drawn.

Horizontal frequency — The frequency with which the electron beam scans across the screen determines the number of pixels across it. Each graphics standard uses a distinct scan frequency.

Vertical frequency — Also known as the refresh rate, this determines the rate at which the entire picture is redrawn on the screen.

Standards

CGA - 640 by 400 (4 colour)
EGA - 640 by 350 (16 colour)
HGA - 720 by 348 (mono)
VGA - 640 by 400 (16 colours)
SVGA - 800 by 600 (16 to 256 colours)
8514/A is the IBM offering of 1024 by 768 with 256 colours (Interlaced).

Please note that there are various 'extended' versions of VGA, and it may be classed as anything over 640 by 400 and above.

Product name	Distributor	Manufacturer	Colour (Y/N)	Multiscan (Y/N)	Maximum horizontal resolution	Maximum vertical resolution	Dot pitch (mm)	Diagonal screen size (mm)	Horizontal frequency (KHz)	Vertical frequency (Hz)	Supports HGA/MDA (Y/N)	Supports CGA (Y/N)	Supports EGA (Y/N)	Supports VGA (Y/N)	Supports Super VGA 800 x 600 (Y/N)	Supports 8514/A 1024 x 768 (Y/N)	Other standards	Warranty	Recommended retail price (excluding tax)	Phone number
Acerview 25	Acer	Acer	✓	✓	1024	768	.28	355	31 - 60	45 - 90	✗	✗	✓	✓	✓	✓	Mac II	12 months	$942	(02) 418 8044
Acerview 33D	Acer	Acer	✓	✓	1024	768	.28	355	31.5, 35.16, 35.5	50 - 90	✗	✗	✗	✓	✓	✓	None	12 months	$690	(02) 418 8044
Acerview 33DL	Acer	Acer	✓	✓	1024	768	.28	355	31.5, 35.16, 35.5	50 - 90	✗	✗	✗	✓	✓	✓	None	12 months	$810	(02) 418 8044
Acerview 34T	Acer	Acer	✓	✓	1024	768	.28	355	31.5, 35.16, 35.5, 48.36	50 - 90	✗	✗	✗	✓	✓	✓	None	12 months	$834	(02) 418 8044
Acerview 56L	Acer	Acer	✓	✓	1024	768	.28	380	30 - 60	45 - 90	✗	✗	✗	✓	✓	✓	Mac II	12 months	$1295	(02) 418 8044
AST Super VGA - LR14	AST	AST	✓	✓	1024	768	.28	355	31.5, 35-38, 48, 57	50 - 90	✓	✓	✓	✓	✓	✓	VESA	12 months	$816	(02) 415 5400
Bull 14" SEVGA Colour	Bull HN	Lucky-Goldstar	✓	✗	1024	768	.28	360	31.5, 35.2, 35.5	50, 56, 60, 70, 87	✗	✗	✗	✓	✓	✗	None	12 months	$664	(02) 847 7100
Cadvision TX2013	TCG Group	Chugai	✓	✓	1280	1024	.31	485	30 - 64	50 - 90	✗	✗	✗	✓	✓	✓	1280 x 1024,1152 x 882	12 months	$3900	(02) 699-8300
Compaq Qvision 150 Colour	Compaq	Compaq	✓	✓	1024	768	.25	381	31.5 - 58	50 - 100	✗	✗	✗	✓	✓	✓	None	12 months	$1719	(02) 911 1999
Compaq Qvision 170 Colour	Compaq	Compaq	✓	✓	1024	768	.25	432	31.5 - 58	50 - 100	✗	✗	✗	✓	✓	✓	None	12 months	$2524	(02) 911 1999
Compaq Reduced Emision VGA	Compaq	Compaq	✓	✗	720	400	.31	355	31.5	70	✗	✓	✓	✓	✗	✗	None	12 months	$1029	(02) 911 1999
Compaq Video Graphics Colour	Compaq	Compaq	✓	✗	640	480	.31	355	31.5	60 - 70	✓	✓	✓	✓	✗	✗	None	12 months	$799	(02) 911 1999
Compaq Video Graphics Mono	Compaq	Compaq	✗	✗	720	400	N/A	355	31.5	70	✓	✓	✓	✓	✗	✗	None	12 months	$408	(02) 911 1999
D1187A Colour Display	Hewlett-Packard	Hewlett-Packard	✓		1280	1024	.31	485	30-64	50 - 90	✗	✗	✗	✓	✓	✓	None	12 months	$4062	(03) 272 2885
Diamond Pro 14	Mitsubishi	Mitsubishi	✓	✓	1024	768	.28	355	30 - 58	50 - 90	✗	✗	✗	✓	✓	✓	8514/A (MI), Mac II	12 months	$1794	(02) 684 7200
Diamond Pro 17	Mitsubishi	Mitsubishi	✓	✓	1280	1024	.26	432	30 - 64	50 - 130	✗	✗	✗	✓	✓	✓	1280 x 1024, MacII,Quadra	12 months	$3595	(02) 684 7200
Diamond Pro 20	Mitsubishi	Mitsubishi	✓	✓	1600	1200	.31	508	30 - 78	50 - 130	✗	✗	✗	✓	✓	✓	Mac II, Quadra,1280 x 1024	12 months	$5988	(02) 684 7200
Diamond Pro 26	Mitsubishi	Mitsubishi	✓	✓	1280	1024	.31	660	45 - 70	50 - 80	✗	✗	✗	✗	✗	✗	8514/A (NI), 1280 x 1024, Unix workstation	12 months	$20,340	(02) 684 7200
Diamond Scan 16	Mitsubishi	Mitsubishi	✓	✓	1280	1024	.28	406	30 - 64	50 - 130	✗	✗	✗	✓	✓	✓	1280 x 1024, Mac II,Quadra	12 months	$2995	(02) 684 7200
Diamond Scan 26	Mitsubishi	Mitsubishi	✓	✓	1024	768	.31	660	15.7 - 38	45 - 90	✗	✓	✓	✓	✓	✓	Mac II & GS, Quadra,	12 months	$18,600	(02) 684 7200
Elzo 6500 Flexscan	Megavision	Eizo	✗	✗	1664	1200	N/A	535	31.8 - 78	55 - 80	✓	✓	✓	✓	✓	✓	1280 x 1024, 1600 x 1200	6 months	$2900	(02) 975 1877
Elzo 9000S	Megavision	Eizo	✓	✓	1024	768	.28	355	31.5 - 50	50 - 80	✗	✗	✓	✓	✓	✓	None	12 months	$1625	(02) 975 1877
EIZO Dual Scan 9062S-Z	Megavision	Eizo	✓	✓	1024	768	.28	355	31.5 - 35.5	50 - 90	✓	✓	✓	✓	✓	✓	Mac II	12 months	$1395	(02) 975 1877
EIZO F340I-W Flexscan Monitor	Megavision	Eizo	✓	✓	1027	768	.28	380	27-61	55-90	✗	✓	✓	✓	✓	✓	None	12 months	$1800	(02) 975 1877
Elzo F750I Flexscan	Megavision	Eizo	✓	✓	1280	1024	.31	533	31 - 64	50 - 90	✓	✓	✓	✓	✓	✓	1280 x 1024	12 months	$5395	(02) 975 1877
Elzo Flexscan 9065S-Z	Megavision	Eizo	✓	✓	1024	768	.28	355	15.5 - 50	50 - 90	✓	✓	✓	✓	✓	✓	EVGA, Mac	12 months	$1635	(02) 975 1877

KEY
N/A Not applicable

MONITORS

Product name	Distributor	Manufacturer	Colour (Y/N)	Multiscan (Y/N)	Maximum horizontal resolution	Maximum vertical resolution	Dot pitch (mm)	Diagonal screen size (mm)	Horizontal frequency (KHz)	Vertical frequency (Hz)	Supports HGA/MDA (Y/N)	Supports CGA (Y/N)	Supports EGA (Y/N)	Supports VGA (Y/N)	Supports Super VGA 800 x 600 (Y/N)	Supports 8514/A 1024 x 768 (Y/N)	Other standards	Warranty	Recommended retail price (including tax)	Phone number
ELZO Flexscan 9070S-Z	Megavision	Eizo	✓	✓	1024	768	.28	410	20 - 50	50 - 80	✓	✓	✓	✓	✓	✓	8514/A (NI)	12 months	$2570	(02) 975 1877
Eizo Flexscan 9080IT-Z	Megavision	Eizo	✓	✓	1280	1024	.28	410	31 - 64	50 - 90	✓	✓	✓	✓	✓	✓	None	12 months	$3100	(02) 975 1877
Eizo Flexscan F550i	Megavision	Eizo	✓	✓	1280	1024	.28	432	31.5 - 64	60 - 90	✓	✓	✓	✓	✓	✓	1280 x 1024	12 months	$3125	(02) 975 1877
Eizo T560i Flexscan	Megavision	Eizo	✓	✓	1280	1024	.31	510	30 - 78	55.9	✓	✓	✓	✓	✓	✓	1280 x 1024, 1600 x 1200	6 months	$4500	(02) 975 1877
Electrohome ECM 1200	Thomas Electronics	Electrohome	✓	✓	640	630	.28	305	15 - 37	47 - 87	✓	✓	✓	✓	✓	✓	None	12 months	$2615	(02) 53 0721
Electrohome ECM1300	Thomas Electronics	Electrohome	✓	✓	910	675	.31	410	15 - 36	50 - 85	✓	✓	✓	✓	✓	✓	None	12 months	$2100	(02) 53 0721
Electrohome ECM1910	Thomas Electronics	Electrohome	✓	✓	1600	800	.31	510	15 - 37	45 - 85	✓	✓	✓	✓	✓	✓	None	12 months	$4915	(02) 53 0721
Electrohome ECM2180	Thomas Electronics	Electrohome	✓	✓	1600	1280	.26	530	30 - 80	50 - 90	✗	✗	✗	✓	✓	✓	None	12 months	$4681	(02) 53 0721
Electrohome ECM2700	Thomas Electronics	Electrohome	✓	✓	700	600	.76	685	15.75 - 21.85	45 - 75	✗	✓	✓	✗	✗	✗	None	12 months	$2750	(02) 53 0721
Everex Mon-300	Multisource	Everex	✓	✓	1024	768	.28	310	15.5 - 35	50 - 70	✓	✓	✓	✓	✓	✓	PGA	12 months	$600	(02) 955 8100
Everex Mon-400	Multisource	Everex	✓	✗	720	400	.29	355	31 - 46	60 - 70	✗	✗	✓	✗	✗	✗	None	12 months	$396	(02) 955 8100
Flexscan T240i	Megavision	Eizo	✓	✓	1024	768	.26	343	30 - 60	55 - 90	✓	✓	✓	✓	✓	✓	Mac	12 months	$1880	(02) 975 1877
Flexscan T660i	Megavision	Eizo	✓	✓	1280	1024	.31	466	30 - 80	55 - 90	✓	✓	✓	✓	✓	✓	1280 x 1024, 1600 x 1200	12 months	$6555	(02) 975 1877
Hitachi CM2087	Hitachi Sales	Hitachi	✓	✓	1280	1024	.31	508	30 - 78	50 - 120	✗	✗	✓	✓	✓	✓	1280 x 1024	12 months	$3900	(03) 555 8722
Hitachi CM2187	Hitachi Sales	Hitachi	✓	✓	1600	1200	.31	533	30 - 78	50 - 120	✗	✗	✓	✓	✓	✓	VGA to 1600 x 1200	12 months	$5550	(03) 555 8722
Hitachi HM4319-D ZHU31	Hitachi Sales	Hitachi	✓	✓	1280	1024	.31	485	30 - 65	55 - 80	✓	✗	✓	✓	✓	✓	None	12 months	$4200	(02) 929 8799
Hitachi HM4319-D ZHU35	Hitachi Sales	Hitachi	✓	✓	1280	1024	.31	485	30 - 65	55 - 80	✓	✗	✗	✓	✓	✓	None	12 months	$4450	(02) 929 8799
Hitachi HM4320-D ZHU455	Hitachi Sales	Hitachi	✓	✗	1280	1024	.28	510	30 - 65	55 - 80	✓	✗	✗	✓	✓	✓	None	12 months	$4995	(02) 929 8799
HP D1195A Egonomic Super VGA	Hewlett-Packard	Hewlett-Packard	✓	✓	800	600	.28	508	31.5	60 - 70	✓	✓	✓	✓	✓	✗	MPR II	12 months	$982	(03) 272 2895
HP Super VGA D1194A	Hewlett-Packard	Hewlett-Packard	✓	✗	640	480	.28	330	31.5	60 , 70	✗	✗	✓	✓	✓	✗	None	12 months	$727	(03) 272 2895
HP VGA D1192B Mono	Hewlett-Packard	Hewlett-Packard	✗	✗	640	480	.28	355	31.5	50 - 70	?	✓	✓	✓	✗	✗	None	12 months	$426	(03) 272 2895
HP D1193A Ultra VGA 17"	Hewlett-Packard	Hewlett-Packard	✓	✓	1024	768	.28	593	31.5 - 60	50, 60, 70, 72	✓	✓	✓	✓	✓	✓	MPR II	12 months	$2153	(03) 272 2895
IDEK MF5121	Tech Pacific	Illyama	✓	✓	1024	768	.31	535	50	90	✗	✗	✓	✓	✓	✓	Mac II, 8514/A (NI)	12 months	$5069	(02) 697 8666
IDEK MF5217A	Tech Pacific	Illyama	✓	✓	1024	768	.26	435	57	90	✗	✗	✗	✓	✓	✓	Mac II	12 months	$2920	(02) 697 8666
IDEK MF5221A	Tech Pacific	Illyama	✓	✓	1280	1024	.31	540	80	90	✗	✗	✗	✓	✓	✓	Mac II, 8514/A (NI)	12 months	$5373	(02) 697 8666
IDEK MF5317	Tech Pacific	Illyama	✓	✓	1280	1024	.26	350	65	90	✗	✗	✗	✓	✓	✓	Mac II, 8514/A (NI)	12 months	$3170	(02) 697 8666
Mitsubishi Diamond Pro 37	Mitsubishi	Mitsubishi	✓	✓	1280	1024	N/A	940	24 - 64	40 - 120	✗	✗	✗	✓	✓	✓	PAL, NTSC, Mac II	12 months	$16,740	(02) 684 7200
Mitsubishi Diamond Scan 20	Mitsubishi	Mitsubishi	✓	✓	1280	1024	.31	508	30 - 64	50 - 130	✗	✗	✗	✓	✓	✓	Mac II, 1280 x 1024	12 months	$4788	(02) 684 7200
Mitsubishi Diamond Scan 29	Mitsubishi	Mitsubishi	✓	✓	800	600	N/A	736	15.5 - 36	45 - 90	✗	✓	✓	✓	✓	✗	Mac II , PAL , Super video	12 months	$8340	(02) 684 7200
Mitsubishi Diamond Scan 33	Mitsubishi	Mitsubishi	✓	✓	800	600	.83	840	15 - 38	40 - 120	✗	✓	✓	✓	✓	✓	Mac II, PAL, NTSC, Super video	12 months	$10,740	(02) 684 7200
Mitsubishi Diamond Scan 37	Mitsubishi	Mitsubishi	✓	✓	640	480	.85	940	15 - 36	40 - 120	✗	✓	✓	✓	✓	✗	Mac II, PAL , NTSC video, Super video	12 months	$14,340	(02) 684 7200
Mitsubishi EUM 1281	Mitsubishi	Mitsubishi	✓	✓	800	600	.28	305	15.6 - 36	45 - 90	✗	✓	✓	✓	✓	✗	Mac II/GS, PAL, Super video	12 months	$1794	(02) 684 7200
Mitsubishi EUM 1491A	Mitsubishi	Mitsubishi	✓	✓	800	600	.28	355	15.6 - 38	45 - 90	✗	✓	✓	✓	✓	✓	PAL	12 months	$1374	(02) 684 7200
Mitsubishi FA3415ETXL	Mitsubishi	Mitsubishi	✓	✓	800	600	.28	355	15.7 - 35.5	50 - 87	✓	✓	✓	✓	✓	✓	Mac II	12 months	$1638	(02) 684 7200
Mitsubishi FA3435ETXL	Mitsubishi	Mitsubishi	✓	✓	1024	768	.28	355	15.7 - 35.5	50 - 87	✓	✓	✓	✓	✓	✓	Mac II/GS, PAL	12 months	$2118	(02) 684 7200
Mitsubishi HC3925ETXL	Mitsubishi	Mitsubishi	✓	✓	1024	768	.28	508	15.7 - 38	45 - 90	✗	✓	✓	✓	✓	✓	Mac II, Mac Quadra, PAL	12 months	$4272	(02) 684 7200
NEC MultiSync 3FG	NEC	NEC	✓	✓	1024	768	.28	380	31.5 - 38	55 - 90	✗	✗	✓	✓	✓	✓	Mac II/LC	12 months	$1216	(02) 868 1811
NEC MultiSync 4FG	NEC	NEC	✓	✓	1024	768	.28	380	27 - 57	55 - 90	✗	✗	✗	✓	✓	✓	Mac II/LC	12 months	$1524	(02) 868 1811
NEC MultiSync 5FG	NEC	NEC	✓	✓	1280	1024	.28	800	27 - 57	55 - 90	✗	✗	✗	✓	✓	✓	Mac II/LC	12 months	$2999	(02) 868 1811
NEC MultiSync 6FG	NEC	NEC	✓	✓	1280	1024	.28	740	27 - 79	55 - 90	✗	✗	✗	✓	✓	✓	Mac II/LC	12 months	$5710	(02) 868 1811
Northman NM-1433D	Anabelle Bits	Northman	✓	✓	1024	768	.28	360	30 - 38	50 - 90	✗	✗	✗	✓	✓	✓	None	12 months	$580	(02) 313 6155
Northman NM-1433LR	Anabelle Bits	Northman	✓	✓	1024	768	.28	360	30 - 38	50 - 90	✗	✗	✗	✓	✓	✓	MPR 1/02	12 months	$690	(02) 313 6155
Optima SRC-1401	Optima	Shamrock	✓	✗	768	1024	.28	360	28 - 40	47 - 90	✗	✗	✗	✓	✓	✓	Mac II	12 months	$500	(02) 638 1222
Optima SRC-1402	Optima	Shamrock	✓	✗	768	1024	.28	360	28 - 40	47 - 90	✗	✗	✗	✓	✓	✓	Mac II, VESA	12 months	$560	(02) 638 1222
Optima SRC-1403	Optima	Shamrock	✓	✗	1024	1280	.28	350	28 - 64	47 - 104	✗	✗	✗	✓	✓	✓	Mac II, VESA	12 months	$2400	(02) 638 1222
Philips 2110	Philips	Philips	✓	✓	1600	1280	.28	530	30 - 82	50 - 160	✗	✗	✗	✓	✓	✓	None	2 years parts, 12 months labour	$8160	(02) 317 5833
Philips 3CM9809	Philips	Philips	✓	✗	640	480	.29	503	31.5	60, 70	✗	✗	✗	✓	✗	✗	Hercules	2 years parts, 12 months labour	From $700	(02) 317 5833

KEY

N/A — Not applicable

MONITORS

Product name	Distributor	Manufacturer	Colour (Y/N)	Multiscan (Y/N)	Maximum horizontal resolution	Maximum vertical resolution	Dot pitch (mm)	Diagonal screen size (mm)	Horizontal frequency (KHz)	Vertical frequency (Hz)	Supports HGA/MDA (Y/N)	Supports CGA (Y/N)	Supports EGA (Y/N)	Supports VGA (Y/N)	Supports Super VGA 800 x 600 (Y/N)	Supports 8514/A 1024 x 768 (Y/N)	Other standards	Warranty	Recommended retail price (including tax)	Phone number
Philips 4CM2799	Philips	Philips	✓	✓	1280	1024	.31	718	30 - 64	50 - 120	✗	✗	✗	✓	✓	✓	XGA, VESA	2 years parts, 12 months labour	From $3190	(02) 317 5833
Philips 4CM4200 (Standard)	Philips	Philips	✓	✓	1024	768	0.28	503	30 - 58	50 - 100	✗	✗	✗	✓	✓	✓	None	2 years parts, 12 months labour	$1180	(02) 317 5833
Philips 4CM4770	Philips	Philips	✓	✓	1024	768	0.31	611	30 - 58	50 - 100	✗	✗	✗	✓	✓	✓	None	2 years parts, 12 months labour	$2268	(02) 317 5833
Philips 4CM6099	Philips	Philips	✓	✓	1280	1024	0.26	611	30 - 66	50 - 100	✗	✗	✗	✓	✓	✓	VESA , MPR-II , Sun, Mac	2 years parts, 12 months labour	From $2650	(02) 317 5833
Philips 7BM743	Philips	Philips	✗	✗	920	350	N/A	503	18.4	50	✗	✗	✗	✓	✗	✗	None	2 years parts, 12 months labour	$265	(02) 317 5833
Philips 7BM749	Philips	Philips	✗	✗	920	480	N/A	503	31.5	60, 70	✗	✗	✗	✓	✗	✗	None	2 years parts, 12 months labour	From $265	(02) 317 5833
Philips 7CM3209/68T	Philips	Philips	✓	✗	1024	768	.28	355	31.5, 35.5, 35.2	50 - 90	✗	✗	✗	✓	✓	✓	XGA	2 years parts, 12 months labour	From $780	(02) 805 4455
Philips 8CM3299	Philips	Philips	✓	✓	1024	768	.28	395	31.5, 48, 48.36	50 - 90	✗	✗	✗	✓	✓	✓	VESA 60/72, MPR-II	2 years parts, 12 months labour	From $990	(02) 317 5833
Philips C2082-DAS	Philips	Philips	✓	✓	1280	1024	.28	510	30 - 82	50 - 160	✗	✗	✗	✓	✓	✓	None	2 years parts, 12 months labour	$6840	(02) 317 5833
Philips CM8833/11	Philips	Philips	✓	✗	640	285	.42	326	15.6	50, 60	✗	✓	✗	✗	✗	✗	None	2 years	$559	(02) 317 5833
Qume QM638	MPA	Qume	✓	✓	1024	768	.28	355	30 - 38	97 - 100	✗	✗	✗	✓	✓	✓	None	12 months	$668	(03) 724 4444
Qume QM648	MPA	Qume	✓	✓	1024	768	.28	355	30-48	50 - 90	✗	✗	✗	✓	✓	✗	8524/A	12 months	$778	(03) 724 4444
Qume QM670	MPA	Qume	✓	✓	1280	1024	.26	432	30-76	40 - 120	✗	✗	✗	✗	✗	✗	None	12 months	$2448	(03) 724 4444
Sampo KDS1984	TCG Group	Sampo	✓	✗	1024	768	.31	510	31.5 - 35.5	60, 70, 67	✗	✗	✗	✓	✓	✓	1280 x 1024	12 months	$2480	(02) 699 8300
Samsung ML4511	Samsung Electronics	Samsung Electronics	✗	✗	640	480	N/A	360	31.5	60 - 70	✗	✗	✗	✓	✗	✗	None	12 months	$325	(02) 638 5200
Samsung ML4571	Samsung Electronics	Samsung Electronics	✓	✓	720	480	N/A	355	31.5, 35.5	60 - 70	✗	✗	✗	✓		✗	None	12 months	$330	(02) 638 5200
Samsung SyncMaster 15	Samsung Electronics	Samsung Electronics	✓	✓	1024	768	.28	381	30-59	50 - 90	✗	✗	✗	✓	✓	✓	None	12 months	$1549	(02) 638 5200
Samsung SyncMaster 2	Samsung Electronics	Samsung Electronics	✓	✓	1024	768	.39	355	31.5, 35.5	56, 60, 70, 86.8	✗	✗	✗	✓	✓	✓	None	12 months	From $669	(02) 638 5200
Samsung SyncMaster 3	Samsung Electronics	Samsung Electronics	✓	✓	1024	768	.28	381	30 - 59	50 - 90	✗	✗	✓	✓	✓		None	12 months	From $810	(02) 638 5200
Samsung SyncMaster 4plus	Samsung Electronics	Samsung Electronics	✓	✓	1280	1024	.31	431	30 - 65	50 -100	✗	✗	✗	✓	✓	✓	VESA	12 months	$2299	(02) 638 5200
Samsung SyncMaster 5C	Samsung Electronics	Samsung Electronics	✓	✓	1280	1024	.26	431	30 - 65	50 - 100	✗	✗	✗	✓	✓	✓	VESA	12 months	From $2999	(02) 638 5200
Samsung SyncMaster 6C	Samsung Electronics	Samsung Electronics	✓	✓	1280	1024	.31	483	30 - 65	50 - 100	✗	✗	✗	✓	✓	✓	VESA	12 months	$4299	(02) 638 5200
Shamrock SRC-1401	Optima	Shamrock	✓	✗	768	1024	.28	340	28 - 40	47 - 90	✗	✗	✗	✓	✓	✓	Mac II	12 months	$500	(02) 638 1222
Shamrock SRC-1402	Optima	Shamrock	✓	✗	768	1024	.28	340	28 - 40	47 - 90	✗	✗	✗	✓	✓	✓	Mac II, VESA	12 months	$2600	(02) 638 1222
Shamrock SRC-1403	Optima	Shamrock	✓	✗	1024	1280	.28	350	28 - 64	47 - 104	✗	✗	✗	✓	✓	✓	Mac II, VESA	12 months	$2400	(02) 638 1222
Shamrock SRC-1901	Optima	Shamrock	✓	✗	1024	1280	.31	580	27 - 72	47 - 104	✗	✗	✗	✓	✓	✓	Mac II, VESA	12 months	$2600	(02) 638 1222
Thomas TMC-1401MF	Thomas Electronics	Thomas Electronics	✓	✓	910	575	.31	370	15 - 36	50 - 85	✗	✗	✗	✓	✓	✗	None	12 months	$3600	(02) 53 0721
TMM 1208V	Thomas Electronics	Thomas Electronics	✗	✗	700	575	N/A	310	15.6	50, 60	✗	✗	✗	✗	✗	✗	None	12 months	$375	(02) 53 0721
TOEI Model CD-128AX	Thomas Electronics	TOEI	✓	✓	800	600	.28	310	15 - 35	45 - 80	✓	✓	✓	✓	✓	✓	XGA	12 months	$3155	(02) 53 0721
TOEI Model FCD2071X	Thomas Electronics	TOEI	✓	✓	1280	1024	.31	510	30 - 70	45 - 130	✗	✗	✗	✓	✓	✗	None	12 months	$8300	(02) 53 0721
Videocom CM-1402	Elite	Delta	✓	✓	1024	768	.28	355	38	90	✗	✗	✗	✗	✓	✓	None	12 months	$450	(02) 898 0222
Videocom CM-1448	Elite	Delta	✓	✓	1024	768	.28	355	50	90	✗	✗	✗	✓	✓	✓	None	12 months	$580	(02) 898 0222
Videocom CM-1468	Elite	Delta	✓	✓	1024	768	.28	355	60	100	✗	✗	✗	✓	✓	✓	None	12 months	$713	(02) 898 0222
Videocom DCM-1568	Elite	Delta	✓	✓	1280	1024	.28	380	65	100	✗	✗	✗	✓	✓	✓	None	12 months	$830	(02) 898 0222
Videocom SCM-1760VA	Elite	Delta	✓	✓	1024	768	.26	430	57	87	✗	✗	✗	✓	✓	✓	None	12 months	$1900	(02) 898 0222
Videocom SCM-2070VA	Elite	Delta	✓	✓	1280	1024	.31	500	71	120	✗	✗	✗	✓	✓	✓	None	12 months	$2500	(02) 898 0222
Viewsonic 4+ Super VGA Interlaced Monitor	Chips and Bits	Viewsonic	✓	✓	1024	768	.28	395	30 - 38	50 - 90	✓	✓	✓	✓	✓	✓	None	12 months	$525	(03) 696 5955
Viewsonic 5E	Chips and Bits	Viewsonic	✓	✓	1024	768	.28	355	31 - 60	50 - 90	✓	✓	✓	✓	✓	✓	VESA, Mac II	12 months	$799	(03) 696 5955
ViewSonic 6FS	Chips and Bits	Viewsonic	✓	✓	1280	1024	.28	381	31 - 60	50 - 90	✓	✓	✓	✓	✓	✓	MPR-II, MacII	12 months	$1075	(03) 696 5955
Viewsonic 6L Super VGA Non-Interlaced Monitor	Chips and Bits	Viewsonic	✓	✓	1024	768	.28	355	30 - 50	50 - 90	✓	✓	✓	✓	✓	✓	None	12 months	$750	(03) 696 5955
Viewsonic 7 SuperVGA Non-Interlaced Monitor	Chips and Bits	Viewsonic	✓	✓	1280	1024	.28	431	30 - 64	50 - 90	✓	✓	✓	✓	✓	✓	Mac II, VESA TUV MPRII	12 months	$2295	(03) 696 5955
Viewsonic 8	Chips and Bits	Viewsonic	✓	✓	1280	1024	.31	508	30-64	50-90	✓	✓	✓	✓	✓	✓	VESA, MPRII	12 months	$3190	(03) 696 5955
Wyse WY 655	Wyse	Wyse	✓	✓	720	480	.30	355	31.46	50 - 70	✗	✗	✗	✓	✓	✗	None	12 months	$1109	(02) 888 7455
Wyse WY-670	Wyse	Wyse	✓	✓	1024	768	.28	355	31.45	34 - 38	✓	✓	✓	✓	✓	✓	None	12 months	$670	(02) 888 7455

KEY
N/A Not applicable

With the increasing use of Windows and multimedia applications, the video graphics adaptor is becoming one of the most important components of the PC. The video performance is probably the greatest bottleneck in overall PC performance with these type of applications.

What to look for

Standards supported — The monitor used should be capable of handling the video standard of the adaptor.

Memory — The amount of memory on the board affects the resolution and the number of colours displayed. Look for the standard memory offering and also memory upgrade options available. Also, cards which use VRAM (video RAM) are faster than those using standard RAM.

Graphic accelerator boards — These usually use special chips that accept specific graphics functions from the CPU and translate them into image information. They can improve performance by up to a factor of 10. Coprocessed boards can be programmed to accept other functions, making them more versatile and more costly.

Terms used

Standard display memory onboard — The amount of memory fitted to the controller board.

Maximum display memory — The maximum upgrade option available.

Non-interlaced — Interlaced monitors scan the screen twice to build an image, displaying alternate lines at each pass. When displaying a moving image at high resolution, this may lead to blurring. A non-interlaced display overcomes this problem by scanning the entire image at one pass.

Product name	Distributor	Manufacturer	Bus type	Supports VGA 640 by 480 (16 colours) supported (Y/N)	Supports VGA 640 by 480 (256 colours) supported (Y/N)	Supports SVGA 800 by 600 (16 colours) supported (Y/N)	Supports SVGA 800 by 600 (256 colours) standard (Y/N)	Supports VGA 1024 by 768 (16 colours) standard (Y/N)	Supports VGA 1024 by 768 (256 colours) standard (Y/N)	Supports IS514/A standard (Y/N)	Other standards supported	Standard display memory on board (K)	Maximum display memory (M)	Non-interlaced (Y/N)	Warranty	Recommended retail price (including tax)	Phone number
Accel Series - EIZO AA 51-1	Megavision	Eizo	I	✗	✗	✗	✗	✓	✓	✓	1280 x 1024 (256 colours, 72Hz)	1M	2	✓	12 months	$3380	(02) 975 1877
Accel Series EIZO AA61-1	Megavision	Eizo	I	✗	✗	✗	✗	✓	✓	✓	None	512	1	✓	12 months	$1900	(02) 975 1877
Actix ACTA	Sprinter	Actix	L,M	✓	✓	✓	✓	✓	✓	✓	None	1M	1	✓	12 months	From $632	(02) 977 8155
Actix ACTA 1280	Sprinter	Actix	L,M	✓	✓	✓	✓	✓	✓	✓	1280 by 1024 (16 colours)	1M	1	✓	12 months	From $679	(02) 977 8155
Actix ACTA 1280TC	Sprinter	Actix	L,M	✓	✓	✓	✓	✓	✓	✓	640 by 480 (16.7M colours)	1M	1	✓	12 months	$713	(02) 977 8155
AIS S3 EISA Bus Windows Accelerator	AI Systems	AI Systems	E	✓	✓	✓	✓	✓	✓	✓	VESA, IBM XGA	1M	1	✓	12 months	$790	(03) 579 0244
AIS S3 Local Bus Windows Accelerator	AI Systems	AI Systems	L	✓	✓	✓	✓	✓	✓	✓	VESA, IBM XGA	1M	1	✓	12 months	$390	(03) 579 0244
AST VGA Plus	AST Researc	AST	I	✓	✓	✓	✓	✗	✗	✗	None	2	512	✗	5 years	$312	(02) 415 5400
ATI 8514/Ultra Graphics Accelerator	Anabelle Bits Sealcorp	ATI	I,N	✓	✓	✓	✓	✓	✓	✓	1280 x 1024 (16 colours), anti-aliasing	512	512	✓	5 years	$625	(02) 313 6155 (02) 319 4611
ATI Graphics Ultra Graphics Accelerator	Anabelle Bits Sealcorp	ATI	I	✓	✓	✓	✓	✓	✓	✓	1280 x 1024 (16 colours), anti-aliasing	512	512	✓	5 years	From $720	(02) 313 6155 (02) 319 4611
ATI Graphics Vantage Graphics Accelerator	Anabelle Bits Sealcorp	ATI	I	✓	✓	✓	✓	✓	✓	✓	1280 x 1024 (16 colours), anti-aliasing	512	512	✓	5 years	From $495	(02) 313 6155 (02) 319 4611
ATI Stereo/FX	Sealcorp	ATI	I	✗	✗	✗	✗	✗	✗	✗	Sound blaster, AdLib compatible	0	0	✗	5 years	$275	(02) 319 4611
ATI VGA Basic 16	Anabelle Bits	ATI	I	✓	✗	✗	✗	✗	✗	✗	None	256	256	✗	5 years	$160	(02) 313 6155
ATI VGA Integra	Anabelle Bits	ATI	I	✓	✓	✓	✓	✗	✗	✗	None	512	512	✗	5 years	$195	(02) 313 6155
ATI VGA Stereo F/X	Anabelle Bits Sealcorp	ATI	I	✓	✓	✓	✓	✓	✓	✗	15 bit colour mode, adlib/soundblaster sound	1M	1	✓	5 years	From $520	(02) 313 6155 (02) 319 4611
ATI VGA Wonder XL24	Anabelle Bits Sealcorp	ATI	I	✓	✓	✓	✓	✓	✓	✗	24 bit colour modes, 15 bit colour modes	1M	1	✓	5 years	From $345	(02) 313 6155 (02) 319 4611
Diamond SpeedStar 24	Megavision	Diamond Computer	I	✓	✓	✓	✓	✓	✓	✗	None	1M	1	✓	5 years	$504	(02) 975 1877
Diamond Stealth	Megavision	Diamond Computer	I	✓	✓	✓	✓	✓	✓	✗	None	1M	1	✓	12 months	$780	(02) 975 1877
Dual VGA - Colour Graphics Communications	Megavision	CCC	I	✗	✗	✗	✗	✗	✗	✗	None	✗	✗	✗	12 months	$1800	(02) 975 1877
EDGE II	Multisource	Everex	I	✗	✗	✗	✗	✗	✗	✗	Monochrome CGA, Hercules	✗	✗	✗	2 years	$120	(02) 955 8100
EIZO MD-809 MK III	Megavision	Eizo	I	✗	✗	✗	✗	✗	✗	✗	1664 x 1200, CBA, MDG, HSC	512	1	✓	12 months	$2960	(02) 975 1877
EIZO MDB12-I	Megavision	Eizo	I	✗	✗	✗	✗	✗	✓	✗	None	512	2	✓	12 months	$4540	(02) 975 1877

KEY

Bus type E - EISA I - ISA M - MCA L - Local

GRAPHICS ADAPTORS

Product name	Distributor	Manufacturer	Bus type	Supports VGA 640 by 480 (16 colours) supported (Y/N)	Supports VGA 640 by 480 (256 colours) supported (Y/N)	Supports SVGA 800 by 600 (16 colours) supported (Y/N)	Supports SVGA 800 by 600 (256 colours) supported (Y/N)	Supports VGA 1024 by 768 (16 colours) supported (Y/N)	Supports VGA 1024 by 768 (256 colours) supported (Y/N)	Supports 8514/A standard (Y/N)	Other standards supported	Standard display memory on board (K)	Maximum display memory (M)	Non-interlaced (Y/N)	Warranty	Recommended retail price (including tax)	Phone number
ELZO VA-41-1 Graphics Adaptor	Megavision	Elzo	I	✓	✓	✓	✓	✓	✓	✗	CGA, MDA	512	1	✓	12 months	$750	(02) 975 1877
ELZO VA-42-1 Graphics Adaptor	Megavision	Elzo	I	✓	✓	✓	✓	✓	✓	✗	800 x 600 x 32,000 colours	512	1	✓	12 months	$810	(02) 975 1877
Everex Viewpoint NI VGA	Multisource	Everex	I	✓	✓	✓	✓	✓	✓	✓	None	256	512	✗	2 years	From $276	(02) 955 8100
Genoa 7800	Hypec Electronics	Genoa	I	✓	✓	✓	✓	✓	✓	✗	VESA	1M	1	✓	2 years	$283	(02) 808 3666
Genoa 7900	Hypec Electronics	Genoa	I	✓	✓	✓	✓	✓	✓	✗	VESA, Hi colour, True-colour	1M	1	✓	2 years	$357	(02) 808 3666
Genoa 8860	Hypec Electronics	Genoa	I	✓	✓	✓	✓	✓	✓	✗	VESA, Hi colour	1M	1	✓	2 years	$503	(02) 808 3666
Micro Eye VOB Video Output Board	The Dindima Group	Digithurst	I	✓	✓	✗	✗	✗	✗	✗	None	0	0	✓	12 months	$2100	(03) 873 4455
MicroEye	The Dindima Group	Digithurst	I	✓	✗	✗	✗	✗	✗	✗	None	1	1	✓	12 months	$1800	(03) 873 4455
MVPVGA2 - Dual VGA Adapter	InterWorld	Industrial Computer Source	I	✓	✓	✓	✓	✓	✓	✓	1280 x 1024	512	1	✓	12 months	$2030	(03) 563 7066
NDI AT2000	Alkira	National Design	I	✓	✓	✓	✓	✓	✓	✓	None	1M	4	✓	3 years	$3850	(02) 876 8000
NDI AT2004	Alkira	National Design	I	✓	✓	✓	✓	✓	✓	✓	1024 x 768 (16.7M colours), 1280 x 1024 (256 colours)	4M	4	✓	3 years	$3800	(02) 876 8000
NDI AT2011S	AST	National Design	I	✓	✓	✓	✓	✓	✓	✓	Includes AutoCAD driver	1M	4	✓	3 years	$3400	(02) 415 5400
NDI AT600Plus	Alkira	National Design	I	✓	✓	✓	✓	✓	✓	✗	1280 x 1024 (16 colours)	1M	1	✓	3 years	$695	(02) 876 8000
NDI AT800	AST	National Design	I	✓	✓	✓	✓	✓	✓	✗	None	1M	1	✓	3 years	$1500	(02) 415 5400
NDI MC1000	Alkira	National Design	M	✓	✓	✓	✓	✓	✓	✗	None	1M	1	✓	3 years	$1900	(02) 876 8000
No 9 GX1 L21	TCG	Number 9	I, M	✓	✓	✓	✓	✓	✓	✓	1280 x 1024 x 16, 1152 x 870 x 256	1M	1	✓	12 months	$1670	(02) 699 8300
No 9 GXi L25	TCG	Number 9	I, M	✓	✓	✓	✓	✓	✓	✓	1280 x 1024 x 16, 1280 x 1024 x 256, 1152 x 870 x 256	2M	2	✓	12 months	$3020	(02) 699 8300
No 9 GXi L29	TCG	Number 9	I	✓	✓	✓	✓	✓	✓	✓	None	4M	4	✓	12 months	$3850	(02) 699 8300
NO 9 GX L5	TCG	Number 9	I, M	✓	✓	✓	✓	✓	✓	✓	1280 x 1024 x 16, 1280 x 1024 x 256	2M	9	✓	12 months	$2900	(02) 699 8300
No 9 GX L3	TCG	Number 9	M, I	✓	✓	✓	✓	✓	✓	✓	1280 x 1024 x 16	1M	1	✓	12 months	$1860	(02) 699 8300
Puretek Trident 1Mbyte	Anabelle Bits	Puretek	I	✓	✓	✓	✓	✓	✓	✗	None	1M	1	✓	12 months	$180	(02) 313 6155
Puretek Trident 256Kbyte	Anabelle Bits	Puretek	I	✓	✗	✗	✗	✗	✗	✗	None	256	512	✗	12 months	$90	(02) 313 6155
Puretek Trident 512Kbyte	Anabelle Bits	Puretek	I	✓	✓	✓	✗	✗	✗	✗	None	512	1	✗	12 months	$145	(02) 313 6155
Truevision 1024 - 32 for Windows	Vision Control	Truevision	I	✓	✓	✓	✓	✓	✓	✓	PAL, NTSC	1M	16	✓	12 months	$4700	(03) 819 0277
Truevision for Windows 3.0 or DOS	Vision Control	Truevision	I	✓	✓	✓	✓	✓	✗	✓	PAL, NTSC	512	1	✓	12 months	$2400	(03) 819 0277
Tseng Labs ET4000 Mega VGA/2	AI Systems	Tseng Labs	I	✓	✓	✓	✓	✓	✓	✓	VESA, IBM XGA	1M	1	✓	12 months	$290	(03) 579 0244
Tseng Labs ET4000 W32	AI Systems	Tseng Labs	E	✓	✓	✓	✓	✓	✓	✓	VESA, IBM XGA	4M	4	✓	12 months	$690	(03) 579 0244
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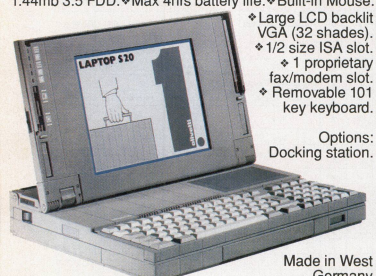
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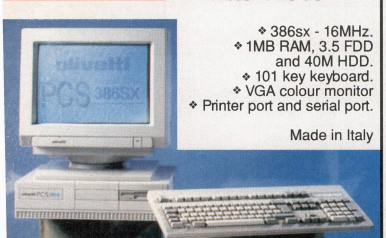
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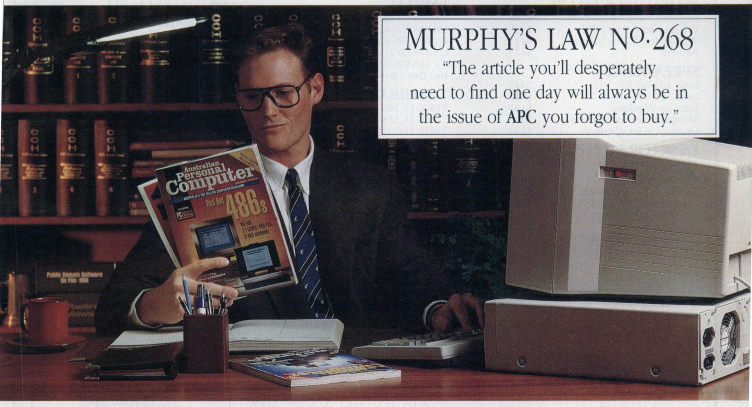


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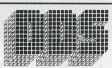
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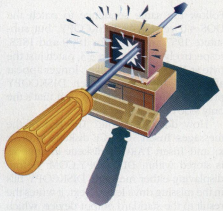
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OPERATING SYSTEMS

MultiBoot upgrade

Prior to upgrading to DOS 5.0, I loved the MultiBoot program obtained from Mag-disk. However, it doesn't work with DOS 5.0. Am I doing something wrong, or is a new version in the works?
Richard Barrows

Australian Personal Computer RESPONSE

MultiBoot allows you to choose different versions of DOS when your system boots, and it's a very popular utility. MultiBoot Version 1.1 has been updated to work properly with DOS 5.0. It's available from Mag-disk (see page 205 for Mag-disk ordering details) — *Joe Salemi.*

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Tracking files

I have a 40M hard disk with more than 1200 files on it, as well as some software such as PC Tools, Quicken, and fax and accounting packages. I'm sure I don't use all of those files in the course of my computing activities, so I'd like to find a package that could tell me what files were accessed in a certain period of time. I'd like to, for example, be able to see which files are not used in the course of one year and delete them to free up disk space. Do you know of any packages that could do this?
Andre Boulanger

Australian Personal Computer RESPONSE

A utility written in 1988, a TSR called RECORDER, creates a list of up to 200 files that have been opened and keeps it in memory. The number of files tracked can be increased to 2000 by a command-line parameter, although the program will then require more RAM to store the larger table. Using DOS' standard redirection commands, you can store the results of a RECORDER session in a text file at any time for later analysis. (RECORDER is available from Mag-disk. See page 205 for details.)

PC-Sentry is a commercial application, a shareware version which is available from Mag-disk. This utility is more sophisticated than RECORDER, supporting the tracking of different levels of file activities. Rather than keeping the information in memory, PC-Sentry creates activity logs in plain text format, stored in a subdirectory on your hard drive. It automatically writes the logs to disk while other disk-writing activities are taking place, so its operation is virtually transparent to the user. The full commercial package includes two versions: a full one that uses 24K of RAM and logs every system activity, and a light version that only takes 10K and logs file operations. Other utilities are included that let you examine, archive and add comments to log files, as well as time specific events such as how long a particular program was active — *Joe Salemi.*

Patching DISKCOPY

Is there a simple way to patch DISKCOPY so that it beeps when floppy disks need to be changed? This way I wouldn't have to stare at the screen waiting for the program to ask for the source and target disks when I duplicate floppy disks in the same drive.
Christopher Stout

Australian Personal Computer RESPONSE

You're right. An audible disk-swap prompt — especially when the source and destination drives are the same — would certainly be convenient when you're using DISKCOPY. You can easily accomplish the modification with DEBUG.

Switch to the directory on your hard disk where DOS files are stored. Make a backup of DISKCOPY.COM before starting so you'll have a copy of the original if something goes wrong.

If you're using DOS 5.0, alter DISKCOPY by running the commands shown below. The first one should be executed at the DOS prompt, the others at the DEBUG hyphen:

```
DEBUG DISKCOPY.COM
E 18C0 07
E 18E8 07
W
Q
```

Follow the same sequence to patch the DOS 4.0 version of DISKCOPY, but substitute 1957 and 197B for 18C0 and 18E8, respectively. For Version 3.3, patch just the byte at 1071. A colon will no longer appear after the drive letter when DISKCOPY prompts you to insert a disk, but that's the only side effect you'll notice.

How does this work? The text of the messages 'Insert SOURCE diskette in drive x:' and 'Insert TARGET diskette in drive x:' is stored within DISKCOPY.COM. Before displaying either message, DISKCOPY fills in the missing drive letter. Next, it writes the result to the standard output device, which by default is the computer screen. All we're doing is using DEBUG to replace the colon following the drive identifier with an ASCII 7, which produces a tone when written to standard output.

Why must we replace a character of the message? Why not just add it to the existing code? That would seem a better way to travel. Yet doing so would cause all subsequent instructions to move, bumping information the program expects to find at certain locations to new, unknown addresses. You can add audible prompts to the text of other DOS commands (such as FORMAT when it asks if you want to format another disk) using a similar procedure. The only thing you need is the correct patch-point address.

To determine the patch-point addresses for other DOS utilities, load the .COM or .EXE file into DEBUG and use either the D (Dump) or S (Search) command to find the text you want to change. (If you edit an .EXE file, you'll need to give it another extension first, otherwise, DEBUG won't allow you to write the file back to disk. After editing is completed, restore the original name.) D is the brute-force method; each time you enter it at the DEBUG prompt, another 128 bytes of the file is displayed. The offset of the first byte in a row shows to the left of the screen in segment:offset notation (4606:0140, for example). The actual bytes (in hexadecimal form) follow, with their ASCII equivalents displayed to the extreme right.

S provides a more elegant means for hunting down a specified text string. If the program is 4096 bytes long (1000 hex), for example, the command

```
S 0100 L 1000 "Insert"
```

will list all addresses at which the word 'Insert' appears. Note that searches are case-sensitive, so 'Insert' is not the same as 'insert'. Also, any numbers you enter in DEBUG must be hex, since the program always thinks in that format.

One tip: type RCX at the DEBUG prompt to find the length, in bytes, of a file shorter than 64K. For a longer one, RBX reveals the number of complete 64K segments in the file, and RCX indicates the bytes remaining. A 69,000-byte file, for example, will show 1 for RBX and D88 for RCX. (Unfortunately, searching files longer than 64K is messy with DEBUG.)

When you've determined the location to change, you can view the contents of the file at that point by typing D, followed by the address. Use DEBUG's E (Enter) command as indicated above to modify the strings at the patch points. Type W to save the modified file and then type Q to quit.

See your DOS manual for more documentation on these and other DEBUG commands — *Jeff Prosise.*

Easy access to PIFs

You can access the Properties dialogue box readily enough by pressing Alt-Enter, but the really important properties of an icon for a DOS program in the Program Manager are not as easily accessible. You need to access them indirectly by running the PIF editor. Here's a trick that uses the Macro Recorder to access the PIF file directly from the icon, with or without the properties box.

Start the Macro Recorder and load the file where you keep your macros. If you don't already have a file of macros, save a new one as M.REC. Switch back to the Program Manager and select an icon that runs a program through a PIF file. Switch back to the Macro Recorder and choose Macro | Record.

Give your macro a name such as 'Edit Progman Item's PIF & Properties'. For the shortcut key, check Ctrl and Alt, and choose Enter from the pull-down list of keys. Playback should be set to Same Application, and Speed to Fast. Check Enable Shortcut Keys, and set Record Mouse to Ignore Mouse.

Press Start to record your new macro and the Recorder will minimise and blink. Hit Alt-F and R to choose Run, type pifedit, and press Enter. Now hit Alt-Tab once to return to the Program Manager, where the icon you chose is still highlighted. Hit Alt-Enter to bring up the Properties dialogue box and Tab to highlight the Command Line field. Press Ctrl-C to copy the name of the PIF file to the Clipboard. Next, hit Alt-Tab once to switch back to the PIF Editor, then hit Alt-F and the letter O to open a file. Hit Ctrl-V to paste the PIF file name as the file to open, and hit Enter to bring it up.

Last, click on the Recorder icon with the mouse and, at the dialogue box, hit Enter to finish your macro. To make sure you don't lose your work, choose FileSave in the Recorder. Put M.REC on the Load= line in WIN.INI or make an icon for M.REC in your StartUp group, so the macro will always be available.

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Anytime you want to see all the properties associated with an icon that runs a .PIF file, just highlight it and press Ctrl-Alt-Enter. You'll see both the Progman properties of the icon and its PIF file. A logical companion to this macro would be one where Ctrl-Enter only brings up the associated PIF file.

I hope other readers of *APC* like the macro. It's made my computer housekeeping easier.

David Friedman

Australian Personal Computer RESPONSE

The term PIF file is actually redundant, since PIF stands for program information file, but it's a common phrase. A PIF contains information that tells Windows about the requirements of a non-Windows program. Highlight the MS-DOS Prompt icon in your Main PROGMAN group and hit Alt-Enter; you'll see that the command line field contains DOSPRMPT.PIF. The PIF Editor utility lets you view and change the information stored in a PIF.

You can create the PIF-display macro by following the instructions above, or you can obtain a copy of PIFMACRO.REC (listed as PIFMAC.REC) from Mag-disk and merge it with your existing macro file. PIFMACRO.REC contains the macro described above, which displays the properties and PIF for a file. It also contains another macro that just displays the PIF, as Mr Friedman suggests.

To create this second macro, start as described above, but name the macro 'Edit Progman Item's PIF'. Set the shortcut key to Ctrl-Enter, and leave the rest of the checkboxes set as described above. Double-check that the highlighted icon in Program Manager is one in which its command line refers to a PIF. Then start recording and enter

- Alt-Enter (bring up the Properties for the icon)
- Tab (highlight the Command Line field)
- Ctrl-C (copy the field to the Clipboard)
- Esc (put away the Properties dialogue)
- Alt-F,R (run a file)
- pifedit
- Enter
- Alt-F,O (open a PIF)
- Ctrl-V (copy from the Clipboard)
- Enter

Click on the macro recorder icon and press Enter to stop recording, then save your work. Now, besides being able to press Alt-Enter to edit an icon's properties, you can press Ctrl-Enter to edit its PIF, or Ctrl-Alt-Enter to edit both!

Windows 3.0 users will have to make some minor changes to these macros. Replace Alt-Enter with Alt-F,P; Ctrl-C with Ctrl-Ins; and Ctrl-V with Shift-Ins — *Neil Rubenking*.

PATHEDIT.BAT **COMPLETE LISTING**

```
@echo off
: PATHEDIT by Rich Davies, Aurora CO
if '%1'=='+'    shift
if '%1'==''     goto help
if '%1'=='-'    goto drop
if '%1'=='sub'  goto sub

: Optionally, put new dir first, path=%1;%path%
path=%path%;%1
ECHO %1 added.
: Display path
path
goto end

:drop
IF '%2'==' goto help
set removed=
set tmp-path=%path%
path=%2
set drop=%path%
: Now drop contains %2 capitalised
path=%tmp-path%
set tmp-path=
for %%a in (%path%) do call %0 sub %%a
path=%tmp-path%
set tmp-path=
IF '%removed%'==' ECHO %drop% not found
IF '%removed%'=='YES' ECHO %drop% removed
set drop=
set removed=
: Display path
path
goto end

:help
ECHO The options are:
ECHO %0 - directory : drops directory from path
ECHO.
ECHO %0 [+] directory : adds directory, "+" is optional
ECHO.
goto end

:sub
if %drop%==%2 SET removed=YES
if %drop%==%2 goto end
if '%tmp-path%'==' set tmp-path=%2
if %tmp-path%==%2 goto end
set tmp-path=%tmp-path%;%2
:end
```

***Fig 1** This batch file lets you add and remove directories from your PATH without any retyping*

Updating your PATH

I've often wanted to add or remove directories from my PATH without having to type out the entire PATH variable each time. I wrote the batch file in Fig 1 to save myself from retyping all the directories I didn't want to change.

To add a new directory to the PATH, PATHEDIT.BAT reads the PATH variable from the environment and adds the new directory to the end. To remove a directory, the program again reads the PATH variable and, using a FOR loop, checks each directory to see if it is the one to be removed.

At first I had a problem with the FOR command because it accepts only one command string after the DO component. So, rather than creating a separate batch file, I included a subroutine in PATHEDIT to handle the removal. If the directory in the PATH variable matches the one to be removed, the subroutine skips adding it to the tmp-path variable used to build the full path.

Another problem was that the directory to be removed needs to be entered exactly as it appears in the PATH statement — that is, in uppercase. I included a trick in the batch file, using the PATH command itself to capitalise the directory name if it is entered in lowercase.

Richard Davies

Australian Personal Computer RESPONSE

Adding a directory to the PATH is easy; you just have to decide whether to add it at the beginning or the end of the list. For years, I've used this simple ADDPATH.BAT file:

```
PATH %path%;%1
```

Removing a directory, though, involves a bit more work. PATHEDIT uses the fact that the FOR command treats the semicolon as a delimiter in its input list. Create and run the following two-line batch file to see this feature in action:

```
= FOR %%f IN (%PATH%) DO ECHO
%%f
```

If you call PATHEDIT with the minus sign as its first parameter, the batch file tries to remove the directory that follows from the PATH. To do so, it first converts the requested directory to uppercase by saving the PATH, setting the PATH to the second parameter, copying the new PATH, and restoring the old PATH. DOS automatically converts the PATH to uppercase, so this manoeuvre has the effect of storing an uppercase copy of the %2 parameter in the variable drop.

Next, PATHEDIT uses a FOR loop to check each existing directory on the path against the directory in the drop variable. It does this by calling itself, with the first command-line parameter set to sub and the second one to the individual directory on the path.

When called with sub as its first parameter, PATHEDIT immediately jumps to the label sub. Here, if the second parameter matches the drop variable, the program skips to the end. If the parameter doesn't match, it adds that parameter to the variable tmp-path. The effect is to build tmp-path from the individual components selected for deletion.

I took the liberty of adding more reporting and error checking to PATHEDIT. After adding a directory to the PATH, it reports its success and displays the new value. If the user wants to drop a directory, it either reports it was successful or that the requested directory was not present, and then displays the new PATH.

PATHEDIT is available through Mag-disk (see page 205 for details) — *Neil Rubenking.*



SPREADSHEETS

START.WK1 — **COMPLETE LISTING**

```
     J                K
1    \0               {PANELOFF}{HOME}~{GOTO}C6~
2                     {?}/C~FNAME~
3                     /FD
4    FNAME
5                     ~
6                     {PANELON}
7                     /FR{NAME}
```

Fig 1 *This short Lotus 1-2-3 macro works with a list similar to the one shown in the screen above to give you a choice of directories. To do this at start-up, it must be named AUTO123.WK1 and placed in the default directory*

A directory menu for 1-2-3

To simplify the start of every Lotus 1-2-3 Release 2.2 session, I wrote the short auto-executing macro listed in Fig 1. This macro, stored in an AUTO123.WK1 file, immediately displays a menu of my data directories and allows me to choose the directory I want to work in. The menu is shown to the right, with two columns of sample directory names — one for my C: drive and one for my D: drive.

The {?} command sets the macro in 'pause' mode while it displays the directory menu. From there, all I have to do is position the cursor on the name of the directory I want and press Enter. The macro resumes by issuing a /File Directory command to make the selected directory the default. Then it presents a list of the worksheet files contained in the selected directory, allowing me to point to the one I want to use.

As I create new directories and clean out old ones, I just update the menu.

John Burnett

Australian Personal Computer RESPONSE

Mr Burnett's simple macro may save a lot of time and key-strokes for users who regularly work in many different directories. It may also prove useful to those who supervise relatively inexperienced 1-2-3 users.

As usual with macros presented here, define the names in the first column for the cells to their right.

If you're planning to give this macro to other users, you might want to embellish it slightly, as indicated in Fig 2. This version includes an **onerror** statement to guard against the possibility that the user will happen to select an invalid directory name. (Ideally, of course, you'll keep the menu up to date so that this can't happen.) The version in Fig 2 also prevents the user from dropping out of the macro with Ctrl-Break. If either of these events occurs, the modified macro beeps, displays a message and then invites the user to try again — *Craig Stinson.*

START2.WK1 — **COMPLETE LISTING**

```
     J                K
1    \0               {onerror tryagain}
2                     {PANELOFF}{HOME}{GOTO}C6~
3                     {?}/CF~NAME~
4                     /FD
5    FNAME
6                     ~
7                     {PANELON}
8                     /FR{NAME}
9
10   TRYAGAIN         {beep}{Indicate MESSAGE}
11                    {wait @now+@time(0,0,3)}{indicate}
12                    {branch \0}
13
14   MESSAGE          Please select a directory and press Enter!
```

Fig 2 *A more sophisticated version of the macro in Fig 1*

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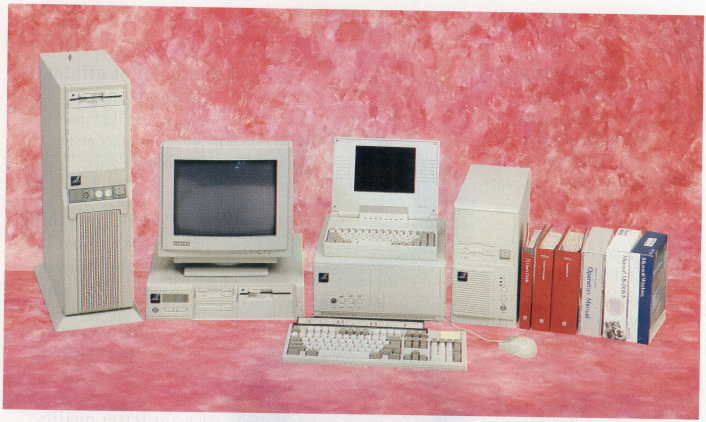
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CONNECTIVITY

Connecting mainframes and LANs

Our organisation isn't downsizing yet, but we are caught in a squeeze. We have many tried-and-true applications on our IBM host computer, but PC users also want to use printers and access files on our NetWare network. We have a sizeable investment in DCA IRMA boards for 3270 terminal emulation in the PCs and in RG-62 cabling for the 3270 connections installed throughout the building.

I know we can install LAN adaptors in each PC and run LAN cable while retaining the 3270 stuff, but there will be many installation problems and added costs. We could also throw out the 3270 equipment and use a Token Ring connection to the mainframe, but that involves even more cost and disruption. Is there any way to use the existing 3270 adaptors and cabling for LAN access, as well as mainframe access?

Bran Puffy

Australian Personal Computer RESPONSE

There are a couple of ways to approach this problem. First, you could use ARCnet adaptors for the LAN. These adaptors use the same RG-62 coax you have already installed for the 3270 connections, and you could install the ARCnet wiring hub near your existing IBM 3X74 controller. Then you would need a LAN gateway to link to the mainframe. This option costs between $200 and $300 per node for the adaptor and hub, plus several thousand dollars for the gateway. Unfortunately, you'd still have to remove the existing 3270 adaptors and face potential installation problems with the ARCnet adaptors.

There are alternatives for achieving LAN and mainframe connectivity that eliminate the need to change anything in the PCs; unfortunately, none of these are readily available in Australia. CoaxNet (from Harris Adacom in the US, tel: 214 386 2000), for example, is a 3270 coax bridge that links as many as 32 PCs into a NetWare LAN through their 3270 coax connections and emulation cards.

The package includes software for each client PC that redirects requests from applications and the command line out through the 3270 adaptor. Each PC provides virtual-drive operation across the network while it retains full access to the 3270 mainframe computer system.

The coax bridge is about seven inches high and fits into a standard 19in equipment rack. You set it up near your 3X74 controller and provide it with a single Ethernet or Token Ring attachment to the LAN.

The principal reason for using existing equipment, however, is to avoid cost and hassle. In terms of local support and costs, it would probably be easier to install new cards and cabling. Most organisations will have had the 3270 equipment (only ever designed for terminal emulation) for at least four or five years.

Products such as Attachmate provide reasonable 3270 emulations. It can also be cost effective to designate one PC in every workgroup as a terminal, which everyone shares, rather than having both connections in all your PCs.

If the most common approach to your situation is to add new LAN cards, this is because, in the long run, it's usually a more effective solution. Contact ComTech on (02) 317 3088 for more information on installing new LAN cards and cabling alongside your 3270 equipment. — *Frank Derfler, Jr*

Creating safer networks

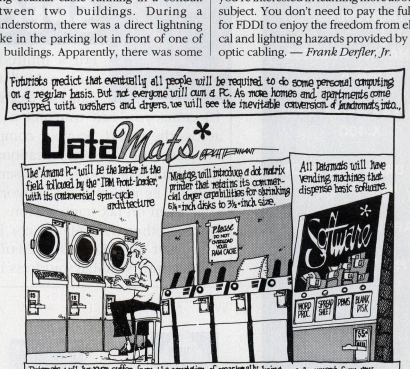
The term 'properly grounded' is unfortunately misunderstood by many people. Last year, one of my clients installed a LAN using coaxial cable running in a conduit between two buildings. During a thunderstorm, there was a direct lightning strike in the parking lot in front of one of the buildings. Apparently, there was some potential between the grounds in the buildings, and the lightning decided that the path through the cable, the adaptors and the frames of the networked PCs looked inviting. Lightning fried every LAN adaptor in the network! Luckily, no-one was hurt. You might want to recommend that this type of cabling be avoided.

Ron Dombrowski

Australian Personal Computer RESPONSE

Had this site grounded the coax cables properly, there would have been no potential difference between the cables and the building. Nonetheless, it just doesn't make economic or practical sense today to use anything but fibre-optic cable to link buildings, not just due to lightning, as it can run to 2km, is less susceptible to environmental problems, and provides greater bandwidth.

You can even purchase small external FOIRL transceivers that attach to the AUI port of practically any LAN adaptor. Most Structured cabling Hubs (SynOptics, Cabletron, etc) provide FOIRL standard ports for their hubs at prices only slightly above those of 10BASE-T or 10BASE-2 ports, and Synoptics also sell for attaching to AUI ports. ComTech (02 317 3088) runs a SynOptics Ethernet Connectivity Course if you're interested in learning more about this subject. You don't need to pay the full cost for FDDI to enjoy the freedom from electrical and lightning hazards provided by fibre-optic cabling. — *Frank Derfler, Jr.*



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WORD PROCESSING

Upgrading printer drivers

Here's a warning for WordPerfect users who are also Hewlett-Packard (HP) LaserJet III owners and are thinking of taking advantage of HP's offer for upgraded printer drivers. I recently requested and received the latest WordPerfect and Windows drivers from HP. A few days after installing the drivers, I discovered that except for the standard set of definitions for paper size and type, all my paper definitions — more than 40 of them — were gone.

According to WordPerfect, each paper definition is stored in the WordPerfect printer driver file (identified with a .PRS file extension). If you upgrade to a new driver, you lose the definitions, and there is apparently no way to transfer the page definitions to the new file.

If you have enough definitions, you may decide that it's not worth the hassle to upgrade, since it means you have to re-enter all of them. However, there is a way to take advantage of the new driver file and still have the definitions in the old file. Simply rename the old file so that you have it available on disk, and then use whichever printer driver file is appropriate.

Dave Ussell

Australian Personal Computer RESPONSE

If you happen to have more than one printer — or one printer with more than one emulation — you'll also find that you have to enter each paper definition separately into each printer driver that you want to use. According to WordPerfect representatives, the ability to copy paper definitions between .PRS files is on a list of possible future features. But until it becomes reality, you'll have to make do.

For now, the general solution to this problem is to always record the procedure for each paper definition as a macro. If you need to enter the definition in another printer file — whether immediately or after some future upgrade — you can then simply run the macro. However, this will only help for definitions you create from now on, and then only if you remember to record the macro.

If you find yourself stuck with lots of paper definitions without macros, and you want to upgrade your driver, then keeping both drivers on disk is a reasonable interim workaround, at least until you find the time to enter the definitions into the new driver file manually. With WordPerfect 5.0 or 5.1, first copy your old printer driver to a new filename in the same directory, keeping the .PRS extension, and then use the standalone PTR program that comes with WordPerfect to modify the printer name as stored in the driver.

To change the name, first run PTR at the DOS prompt, along with the copy of the driver, by entering

```
PTR FILENAME.PRS
```

The opening screen will show you the printer name as it appears in WordPerfect when you select printers. Choose 3 (Rename) from the menu and modify the printer name so you'll be able to distinguish it from the same printer listed in the new driver. Hit Enter when you've finished typing the new name, then F7 to exit. Saving the modified .PRS file and exiting back to DOS follows essentially the same procedure as saving a file and exiting WordPerfect.

Next, move into WordPerfect, hit Shift-F7, Select Printer, Additional Printers, List Printer Files, highlight the filename you've just modified, choose Select and then follow the normal procedure for adding a new printer.

The new printer name will appear as one of the choices on the Select Printers screen. You can then switch between the old driver and the new driver at any time by pressing Shift-F7 and choosing Select Printer.

Note in passing that although these comments are focused on WordPerfect 5.0 and 5.1, the same problem and underlying concepts apply to WordPerfect for Windows. However, there is one important difference. If you're printing with the Windows driver in WordPerfect for Windows, settings are not stored with the Windows driver. Furthermore, page definitions are limited to creating label definitions that will fit on whatever page size is defined in the Windows driver.

If you're printing from WordPerfect for Windows with the WordPerfect driver, however, the same considerations apply as with DOS WordPerfect 5.1. WordPerfect for Windows also uses PTR.EXE to modify its drivers'. Note that PTR.EXE remains a DOS program in the WordPerfect for Windows package — *David Stone.*

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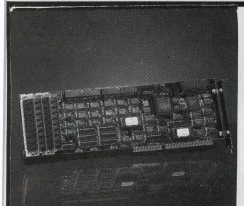
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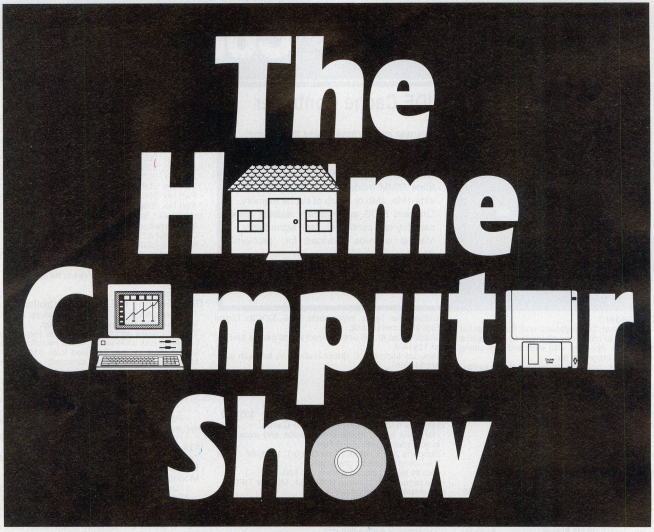
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Conferences/Meetings

November

9-13 **IEEE TENCON '92 — Technology Enabling Tomorrow** The Institute of Electrical and Electronics Engineers (IEEE) is hosting an international conference covering the theme 'Computers, Communications and Automation Towards the 21st Century'. It will be held at the World Congress Centre in Melbourne. *Enquiries, IEEE, tel: (03) 646 4122*

10 **Transforming the Organisation: Information Technology and Business Engineering** This half-day seminar, organised in Sydney by the Australian Computer Society, details how Business Process Re-engineering may possibly be the key to reaping the real benefits from investments in Information Technology. *Enquiries, Australian Computer Society, tel: (02) 211 5855*

17-20 **Spook 92** Topics included in this four-day training seminar from Object Oriented include 'Object-Oriented Technology: From a Management Perspective', 'A Large Scale Users Assessment of Object Technology' and 'The OMT Methodology'. It will be held at The Ramada Hotel in Bondi Beach (Sydney). *Enquiries, Object Oriented, tel: (02) 957 1092*

24 **Windows Special Interest Group** This group is part of the Sydney PC User Group and meets on the fourth Tuesday of each month at the Bowlers Club in York Street, Sydney, at 6pm. *Enquiries, Peter Deegan, tel: (02) 565 1991*

28 **PC North** A special part of the Sydney PC User Group, PC North Computer Group meets on the fourth Saturday of each month. *Enquiries, Bruce Elsegood, tel: (02) 489 2874*

December

3 **Visual Basic Professional Developers Conference** To be presented in Melbourne by Windows Solutions in conjunction with Microsoft, this one-day conference will inform Visual Basic developers on the technical aspects of Visual Basic and show developers how to use the wide range of add-ons now available. *Enquiries, Windows Solutions, tel: (03) 532 0684*

7-8 **Government IT Purchasing Policy Reform** Organised by IIR, this conference includes a briefing on how the new rules for public sector Information Technology procurement affect agencies, users and suppliers. Some of the issues to be covered at this Canberra conference include GOSIP and Open Systems, as well as liability under GITC. *Enquiries, IIR, (02) 929 5366*

Exhibitions

November

25-27 **Software Developers Expo** A conference will be held in conjunction with this expo sponsored by Symantec. The event offers an opportunity for developers to gain essential knowledge on programming techniques, development issues and the latest products and industry trends. Forty technical sessions are to be presented by industry leaders, and exhibits from a range of vendors will be on show. *Enquiries, Jacquii Graham, tel: (02) 879 6577*

Training

November

9-11 **Hands-On LAN Design and Implementation** IIR Technology offers this three-day course in North Sydney for technical professionals involved in the design, implementation, maintenance and support of a Local Area Network. *Enquiries, IIR Technology, tel: (02) 959 5455*

12-13 **Data Recovery and Virus Control** IIR will present this course to enlighten you in the inner workings of the file management and hardware systems, and give you the skills to bring your data back from the grave. The course will be held in Melbourne on these days and in Sydney from the 26th to the 27th. *Enquiries, IIR Technology, tel: (02) 959 5455*

16-17 **Advanced WordPerfect 5.1 for Windows** MTE presents this two-day course with emphasis falling on using outlines, styles, macros, merging and sorting, as well as the many tools available in this powerful package. It will be held in Brisbane on these days. (Also enquire about other MTE Training Centres around Australia that will also hold this course.) *Enquiries, MTE, tel: (07) 840 9248*

18-20 **Internetworking** This three-day course will take you through LAN configuration, repeaters, protocol packet interpretation, bridges and routers, as well as a case study. It will be held by IIR in Melbourne on these days and later in Sydney (December 7-9). *Enquiries, IIR, tel: (02) 959 5455.*

20 **Managing a Network with Windows Workstation** This one-day course presented by Future Technologies will be held in York Street, Sydney. *Enquiries, Future Technologies, (02) 299 1400*

23-24 **Token Ring Fundamentals** In this three-day course, you'll discover the 'hidden secrets' of the IEEE 802.5 Token Ring network, and master the concepts and implementation of the Physical, Mac/Data link levels associated with the Token Ring network. The course will be presented by Ungermann-Bass in Melbourne on these days, and later in Sydney (December 7-8) and Canberra (December 7-8). *Enquiries, Ungermann-Bass, tel: (03) 696 2006*

25-27 **NetDirector Network Management** Presented by Ungermann-Bass, this course will provide the knowledge and skills required to operate and manage the various components of the network using NetDirector. It will be held in Melbourne on these days, Sydney on December 2-3 and Canberra on December 9-11. *Enquiries, Ungermann-Bass, tel: (03) 696 2006*

November/December

30-2 **ISDN** This three-day Integrated Services Digital Network seminar will be presented in Melbourne by Housley Communications and provide you with a complete understanding of ISDN concepts, as well as the signalling, interworking and supplementary services involved. *Enquiries, Housley Communications, tel: (02) 499 2666*

Diary Data is compiled by Ornella de Rubeis, tel: (02) 288 9125. For inclusion in this section, fax details of your upcoming conference, meeting or exhibition to Ornella on (02) 267 4903.

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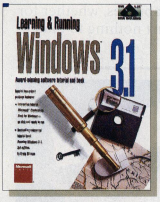
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NOV 92

Windows 3.1 book bonanza



Learning & Running Windows 3.1

Publisher: Microsoft Press
Author: Craig Stinson
Distributor: Penguin Books
Telephone: (03) 871 2400
Price: $65
ISBN: 1-55615-431-3

Running Windows 3.1 is the key issue in this book. Although a fairly weighty offering (525 pages), *Learning & Running Windows 3.1* — yet another from Microsoft Press' massive stable — keeps things pretty well tied down to day-to-day windowing.

It's aimed squarely at users, not fiddlers and tinkerers. If you're a newcomer who wants to know how Windows 3.1 can be used most effectively, what is included and how to work File Manager, then this book will suit your requirements. It provides you with some hints and tips, but doesn't become overly technical; more along the lines of a filtered and flavoured Windows instruction manual than anything else.

But having said that, the book is something of a staid production. The overall feel is more of easy-easy rather than one of pushing back knowledge barriers. The layout is very Microsoft standard, with neat screen shots, special logos for tips and italics/bold type for important sections.

The index is comprehensive and better (more logical) than Microsoft's labyrinthine original in the Windows manual. Useful information on third-party applications is surprisingly objective even if it's a bit thin on the ground: only a few major software examples are mentioned.

The book works you through from the simple basics, showing obvious problems and answers. A jolly tutorial disk in 5.25in format is also thrown in, but it's a tad condescending and slightly simple in approach. It's not directly linked to either Windows or the book, so there won't be any use for the disk unless it's run in a separate window — and that means you need to know how to use Windows. Catch 22!

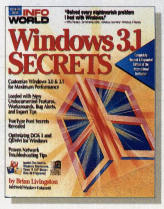
This book is more user friendly than the original Windows 3.1 manual, but cannot really be described as a 'desktop companion' as stated on the dust cover; it's too large and not that comprehensive. However, it's a good option for Windows buyers who like the Microsoft style of publishing.

Windows 3.1 Secrets

Publisher: InfoWorld Technical Books
Author: Brian Livingston
Distributor: Woodslane
Telephone: (02) 979 5944
Price: $85
ISBN: 1-878058-43-6

I like this book. It starts with a whiz-bang cover and ends with three disks crammed with over 40 shareware programs. Inbetween are 990 pages of secrets, hot tips, and undocumented feature listings, as well as nearly 40 pages of Index. Unfortunately, you also receive the thinnest dust covers that curl at a moment's notice; but that is about the only negative aspect of the book.

Updated from the Windows 3.0 version, it deals with Microsoft's latest offering in a very logical fashion: not based

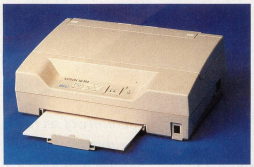


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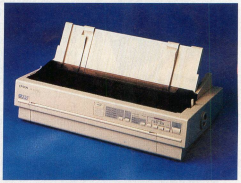
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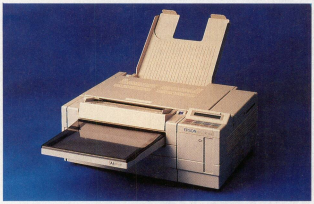
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on Windows itself, but on how you are likely to use it. Following some information about what Version 3.1 does better than 3.0, you also receive information on how to customise your start-up, run DOS, program in Word, run built-in applications and streamline your normal software. The secrets come in ever-increasing quantities.

Next, you're told how to optimise your hardware to the fullest — to help you communicate effectively, to set up, troubleshoot and use a network, as well as tread through the maze of Windows video options. A comprehensive list of hardware vendors is also given, with some of the idiosyncrasies they can throw through your Window sessions.

There are also sections on how to utilise DOS to the best advantage, use proprietary memory managers and convert your company to Windows. This is all real-world stuff, but also included are tips on how to make Windows perform some things it shouldn't, such as 'band-aid workarounds' and secret-agent undocumented tasks. Similar to using the Version 3.0 File Executive (it's faster), pop up your own logo on start-up or make the development team reveal themselves and dance on your screen!

This book is obviously written by an expert who enjoys his work — not necessarily a total Windows missionary, but someone who revels in finding out and passing on as much information as possible. He gives heaps of expert distilled information from Windows 3.0 onwards, and looks at the software as a tool and explains how to get the most out of it.

Windows 3.1 Secrets has heaps of examples, both simple and complex. As such, it's equally good for the basic data worker or techie performance wringer. It is not a snow job, it's extremely comprehensive and it even has a section on RSI. As a package, it is worth buying for shareware alone, but it rates at the top of my list for information. Definitely a 'must' buy.

Working with Windows 3.1

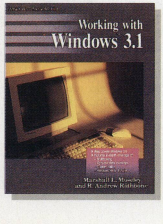
Publisher: Windcrest/ McGraw-Hill
Authors: Marshall Moseley and R Rathbone
Distributor: McGraw-Hill
Telephone: (02) 417 4288
Price: $35.95
ISBN: 0-8306-7722-4

This book is something of a mystery. Just who is it aimed at? It tells you everything you need to know about installing Windows, how to run it and its setup — exactly what the manual and setup software tell you when you buy Windows 3.1.

The style of the book is more like a basic primer, with one of those 'In the beginning, there was the PC' introductions waffling on about the birth of the PC. That's of no relevance to today's Windows users, unless they're delving into the depths of XMS, EMS, and so on. But that is just what this book doesn't do.

If you need any information on customising your installation, don't look here. It's straight-down-the-middle information. The level of complexity dealt with can be illustrated with the following example: a sketch of a mouse, with the caption 'Your mouse will look something like this'. Useful stuff!

The layout, indexing and screen dumps are all quite well done, but it doesn't seem to be at all interesting. It's virtually a precis of Microsoft's manual with a little more information on the setup program. The book doesn't include anything about third-party applications — the very reason most people opt for Windows. The included desktop applications, such as Paint, Write and Terminal are covered adequately, but again, no better than the manual. There's no detailed coverage of .INI and .PIF files, or how to set up program and make non-standard icon selections. These areas should be covered in any serious third-party book.



The cover blurb includes a couple of claims, such as 'Say goodbye to confusing software manuals' and 'everything you need from initial setup . . . to customising [Windows'] sophisticated data sharing and memory management tools'. Neither of these claims seem to be seriously addressed in the book, but there is a sizable chunk on how to use Windows' Help. Wow!

In brief, this book seems to be aimed at the user who does not have a manual and probably wouldn't read it if there was one. It really doesn't offer much at all, and seems to be merely jumping on the Windows bandwagon.

Windows 3.1 Companion

Publisher: Microsoft Press
Authors: Lori Lorenz, R O'Mara and Russell Borland
Distributor: Penguin Books
Telephone: (03) 871 2400
Price: $50
ISBN: 1-55615-372-4

Windows 3.1 Companion has a lot of colour plates, a very useful quick-reference guide (found in the back), and 20 pages on Solitaire and Minesweeper. Even with all that included, it doesn't really have anything terribly special to offer.

Published by Microsoft Press, it seems to fit into the bookshelf as a quick-and-simple reference rather than a full-scale companion. Nonetheless, it has plenty of well laid out information presented in an easy-to-find fashion.

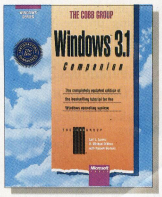


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It follows the usual pattern for after-market guides, with a getting started section followed by basic operating methods for the File Manager, Program Manager and Task Manager. Although these areas are dealt with effectively and in a very accessible manner, they seem to be slightly simplistic in approach. Plenty of screen shots keep the text interesting and easy to assimilate, but they don't offer much more than an average tinkerer would find out in any case. The strange thing is that *Windows 3.1 Companion* takes over 520 pages to say very little.

All the included accessories and desktop applications are covered, each accompanied with examples and 'mini-guides'. This is the main strength of the book, but when it comes to using third-party or other Windows applications, the Companion is surprisingly unhelpful. Almost no mention is made of other software.

Once you have worked your way through the rest of the basic information, the appendices contain some useful tips on PIFs, customising the AUTOEXEC and SYS files, as well as installing various device drivers. But, they're not very comprehensive.

The book's glossary is also good, and the index is well-sorted if not massive. A question mark, however, still hovers over what the book aims to do. If it's a replacement for the manual, then it's not technical enough. And if it's a quick guide, then it's too big. In truth, the book is just another Windows 3.1 shelf-filler — but a nice one to look at, certainly.

PC Magazine Guide to Using Windows 3.1

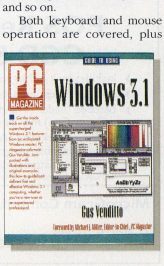
Publisher: Ziff-Davis Press
Author: Gus Venditto
Distributor: Woodslane
Telephone: (02) 997 3382
Price: $60
ISBN: 1-56276-009-2

Billed as a guide to using Windows 3.1, this book is exactly that — no more, no less. *PC Magazine Guide to Using Windows 3.1* is not overly technical, but has all the details you need to become an efficient user. It's not written as a manual, but more like a book. It's easy to follow, logical and well laid out. The only detraction is that some screen shots look as though they've come from Windows 3.0.

The basic operations using File and Program Managers are covered. Then, after touching on the accessories, the book delves into using the extra facilities of Windows, such as multiple programs, linking, pasting, and so on. Each chapter has a handy list of menu options, which provide all the cascaded menu selections. They're very useful if you're not sure which menu selection to make.

In each area, the potential of every accessory or application is detailed, along with how it works and a feature list. This provides you with handy hints on ways to make the most of each 'desktop applet', such as setting up for everyday use, making best use of the calendar and notepad via the clipboard, and so on.

Both keyboard and mouse operation are covered, plus how to set up your hardware and software to maximise its potential. Although no in-depth technical information is given, there's a good section dedicated to SYSEDIT and its fine-tuning capabilities. Likewise, general housekeeping and the care and housekeeping of your .INI files are both well documented.



Gus Venditto is a long-time worker on US-based PC Magazine, and his experience shows. There are plenty of tips on what hardware works best with Windows, what RAM you need for which setup, as well as low-level but concise and useful information on configuring available memory. The 286 machine is also covered, which could be handy if you have any old ATs needing a dose of Version 3.1.

You'll find some useful information on the 'ins and outs' of expanded memory, making the most of what RAM you have and using third-party memory managers where possible. Other chapters deal with speeding up run speeds, clipboard usage, OLE, the object packager, DDE, printing and fonts (TrueType and third party). But none of this is above the level of the reasonably intelligent first-time user, so the 'Guide To' tag still holds.

In all, this book is an excellent addition to the Windows manual. It provides enough readily accessible information in a well structured way and doesn't get lost in manualese.

Concise Guide to MS Windows 3.1

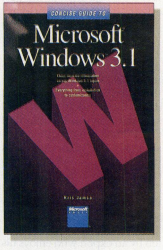
Publisher: Microsoft Press
Author: Kris Jamsa
Distributor: Penguin Books
Telephone: (03) 871 2400
Price: $19.95
ISBN: 1-55615-470-4

If I wanted a quick and easy book to help me find a way through Windows 3.1, I would opt for this book. *Concise Guide to MS Windows 3.1* is slim (under 200 pages), smaller in format than most of the competition and published by Microsoft. What more could you ask for?

The introduction is slightly sycophantic with some blurb about the PC revolution being followed by the Windows revolution, but once into the Windows stuff, it delivers very competently.

Unlike many of the other books, it recommends Windows Tutorial — a sensible route which helps the user and keeps the page count down.

Layout is very easy to use, with both type and colour differentiation for headings and logos. This is one of the easier books to navigate, thanks to careful design. Virtually all operations are double entered for mouse and keyboard operation. Although some jargon — minimising, maximising and incremental sizing of windows, for example — is included, good screenshots and illustrations make it fairly obvious what is being described.



The *Concise Guide to MS Windows 3.1* kicks off with essential operations, such as mouse control, window operation and Help, and then moves to the Program Manager and File Manager, which it covers in fairly good detail (bearing in mind it is a concise guide). One way the author seems to have saved space is by reducing the size of the screenshots — a sensible idea.

The Control Panel receives a good airing too, with all aspects covered from the Windows interface point of view, although no .INI and .PIF text-editing details are given. The Desktop applications and Games groups are each given a cursory chap-

ter. This is sensible in a concise guide, as a full section would merely increase bulk without usefulness.

The Appendix (strangely) tells you how to install Windows to your best advantage; this would be better placed at the start of the book.

But overall, this book is a very useful and well priced item for those who don't want to dig into the manual too often.

Using Windows 3.1

Publisher: Que Corporation
Authors: Ron Person and Karen Rose
Distributor: Prentice Hall Publishing
Telephone: (02) 939 1333
Price: $54.95
ISBN: 0-88022-731-1

Que has made a name for itself as a major and very effective publisher of computer books. Que's *Using Windows 3.1* is a heavyweight featuring over 1000 pages of in-depth information on Version 3.1.

It's broken up into seven basic parts, starting with Getting Started, which gives the basic



'how to', 'what to' and 'why' aspects. Thereafter, the more detailed second section dips into the day-to-day running of File Manager, Program Manager, Control Panel as well as linking technologies. There's also a section on a sample business scenario, which gives some practical application illustrations.

The presentation of the book is not particularly stunning — in fact, very conservative in design, with the tips and icons in a subdued blue colour. One extra included by Que is its 'on the move' cross-reference feature. If you're working through one section, and a useful extra snippet of information is to be found elsewhere, you'll find a small 'From Here . . .' logo and a page reference or two. This is particularly useful when you're working through a section but you may need to alter your setup, check some files or simply need more information.

All the tips and cross references have a blue tag on the endpaper, which would be useful if there were a few dozen. However, since there are hundreds, it simply makes a confusing pattern when the book is closed. Once the basics have been covered, Que moves onto the Desktop Accessories, which it covers in some depth but could improve with some examples.

Practical use of Applets is also detailed, but only through the use of Word for Windows; a few other examples would have been valuable. A fairly comprehensive section on tune-ups is provided, as is a very informative section on network usage and setup. Lots of examples and configuration details are provided here — in fact, more than any other section.

The last section in the book deals with Windows resources: bulletin boards, software suppliers and help lines. The only snag is that they are all US-based, so get ready for some big phone bills if you do use the references given.

In essence, *Using Windows 3.1* could replace the manual for most operators. The only caveat is the dearth of actual working examples. Otherwise, it's well presented and useful for the Windows gazer.

Windows 3.1 — The Pocket Reference

Publisher: Osborne/McGraw-Hill
Author: Allen Wyatt
Distributor: McGraw-Hill
Telephone: (02) 417 4288
Price: $19.95
ISBN: 0-07-881824-9

Windows 3.1 — The Pocket Reference is the smallest book in our Windows selection. It's also one of the easiest to use, it has a special lay-flat binding and it's cheaper than most.

This is the ideal book for corporate users who have a system administrator who performs all the fiddly bits for them, or users who need a book for everyday use without the technical confusion. It's a simple driver's guide. At a mere 216 pages, this book is a toddler in comparison to many of the others reviewed, but has all you need to know about working Windows.

It's not very hot on third-party software and fine tuning; in fact, it's cool — there is very little data on these areas. Instead, the book sensibly advises users to stick with defaults.

The structure of the book is extremely logical, with a superb contents section (which almost makes the index defunct), followed by a couple of chapters on starting and running.

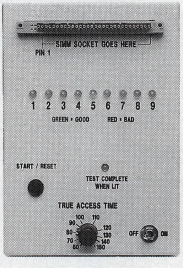
But the important meat of the book comprises a Command Reference section, which deals (in order) with every command available in Windows.

So if you want to change a colour, look in the index for colour change, turn to the page listed — it tells you to go into Control Panel — then simply follow the instructions given. Easy! It's also a lesson to some other complex methodologies.

Both mouse and keyboard operations are given, and small logos duplicate the Windows icon you should be working under to make everything crystal clear.

The book finishes off with another sizeable section called Task Reference. This is where you learn to execute: resize, move, print, configure, copy files, and so on. Again, this section is well set out and very logical.

In summary, this book is excellent for the user who doesn't want to learn about Windows, but simply wants to use it. Highly recommended.



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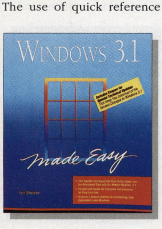
Publisher: Osborne/ McGraw-Hill
Author: Tom Sheldon
Distributor: McGraw-Hill
Telephone: (02) 417 4288
Price: $43.95
ISBN: 0-07-881725-0

Tom Sheldon has been around for some time, writing books on how to carry out things with computers. In fact, he scores two volumes in this review. And without being unkind to him or his publishers, it looks as though he initially wrote the *Windows 3.1 — The Complete Reference* and then whipped off a quick *Windows 3.1 Made Easy* version to fill a gap.

This version for the beginner is nothing exceptional. It deals with the usual setup, basic operations and applications in the usual order. Why doesn't somebody take a real-life scenario and work through it for a change? That's what beginners want (and need), not how to configure serial ports. That's enough tub thumping.

The design of the book is a little staid, but has useful chapter tabs on each page to make subject location easier. Again, there's a lot of fairly superfluous information on how to use Write, Calendar, Clock and Paintbrush. Most users I know buy Windows because they need to in order to run much better word processors and graphics software, not because they can have fun with Write and Terminal.

But I must stop complaining! The use of quick reference logos is a bit thin in this book. It is predominantly textual, apart from pointing hands and screen shots. As a result, it's not an exciting read, and many of the tips do not have a cross reference where it would be useful. Instead, you have to fiddle around in the index, which is neither the biggest nor the most comprehensive available.



As you have probably guessed, I did not rate this book highly. Either stick with the manual or turn to Sheldon's other (and much better) book.

PC Plus Step by Step Windows 3 & 3.1

Publisher: New Tech
Author: Arthur Tennick
Distributor: Butterworth Heinemann
Telephone: (02) 335 4444
Price: $42.95
ISBN: 0-7506-0740-8

As an ex-Pom, I should like this book. It's written by an English writer, but I'm afraid that's not enough to swing the balance.

PC Plus Step by Step Windows 3 & 3.1 is small, relatively expensive and uses phrases such as 'Welcome, as they say, to the world of Windows'. Come on Mr Tennick, you can do better than that.

And although I am not a big fan of filling up space with screenshots, not having the first glimpse of Windows until page 41 is a tad late in a small-format 256-page book. But what about the content? Bearing in mind the author has taken a step-by-step approach, you are advised to '. . . look at your AUTOEXEC.BAT and CONFIG.SYS files . . .' if things do not work properly. There's no hint as to where they are, or how you might find out. Hmmm . . .

The books style tends to be a little preachy, with gems like: '. . . I happen to think it is quite simply . . .' littering the pages. However, the book deals with each application in a straightforward way, and examples are provided and worked through. Not all bad.

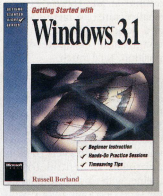
A brief section on third-party software (with most of the major names receiving a mention) and a very cursory glimpse of networking, OLE and swapfiles are also included. None of these sections accomplish much more than make the reader aware they exist.

Little use is made of icons or cross references, and the index is very basic. Further, most of the references are UK-based — not too useful. Taken as a step-by-step guide to Windows, this book is not on my 'must have' list (even if I was born in England).

Getting Started with Windows 3.1

Publisher: Microsoft Press
Author: Russell Borland
Distributor: Penguin Books
Telephone: (03) 871 2400
Price: $35
ISBN: 1-55615-472-0

Any book that claims on the back cover to let the reader '. . . see how easy and fun learning Windows can be!' rouses my critical instincts. That kind of whitewash usually covers some pretty dodgy writing and production. But, to my surprise, *Getting Started with Windows 3.1* is a really good book.



Written in a contemporary style, it combines warmth with information, facts with practical uses, and provides plenty of insight into what the Windows beginner will need to know. This book is definitely not a manual clone.

How would you introduce an ignorant friend to Windows?



Would you play a game? Well, that's just what Russell Borland does. A short-time playing with Minesweeper soon has mouse control, window sizing, menu selections and open/close conventions sorted out with no trouble at all. There's even a small picture of someone sitting at a desk to indicate the most comfortable computer-work position. Nice touch.

Following a couple of sections that deal quickly with help and file conventions is a chapter called Creating your own Workspace — much nicer than Control Panel Explained, don't you agree? Again a very friendly approach is central to the theme, with tips on wallpapering, and decorating your walls and windows thrown in. Plenty of screenshots and very pertinent tips (for LCD screens, for example) complete the package.

A brief word or two on networking is included, but nothing about setting up a network. The basic applications — Write, Paintbrush, Terminal, etc. — are covered well, again in a light but informative style. With a 14-page index and a comprehensive contents section, finding your way around is easy. There's also a highly relevant section in the book detailing how to go back and change your Windows setup, should you need to.

This book is great for beginners. All manuals should be written like this one — with no whitewash.

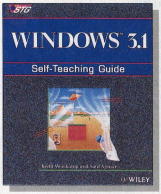
Windows 3.1 Self Teaching Guide

Publisher: John Wiley & Sons
Authors: Keith Weiskamp and Saul Aguiar
Distributor: Jacaranda Wiley
Telephone: (02) 805 1100
Price: $39.95
ISBN: 0-471-55870-2

Hey, what's this? A book written by trainers who know about Windows (as opposed to a book written by 'Windowers' who know very little about learning processes)? Yep, it's an interactive book that can help you learn.

The big difference between this softback edition and the rest of the batch is not the contents; they all deal with the basic Windows shell, the Applications and Accessories. The difference is how much it involves the reader. This book asks you questions.

Instead of a load of whoops-a-daisy about how to move swap files to RAM if you have the room, as well as the will and technical knowledge, it asks you what applications you have available. Hey, that could be useful. Instead of dabbling in .PIF editing syntax conventions, it asks you how much space is needed for Windows to run, and what the differences are between enhanced and standard modes. Some real learning could take place here!



At the end of each chapter — signalled by a lightning bolt, which hopefully corresponds to enlightenment — a quick summary of all that has been covered as well as a series of exercises to reinforce all you have learnt are included (reminiscent of the school days!).

All the Windows-inclusive software is well covered in the same way, and the fact there are no appendices seems to indicate the authors managed to put everything in the right place, with no left overs.

A solid index with very little annoying cross-referrals completes what must be one of the best Windows text books for those learning either in a group or on their own. This book is highly recommended.

Windows 3.1 — The Complete Reference

Publisher: Osborne/ McGraw-Hill
Author: Tom Sheldon
Distributor: McGraw-Hill
Telephone: (02) 417 4288
Price: $63.95
ISBN: 0-07-881747-1

This is Tom Sheldon's other book — the one to opt for given the choice. It's obviously aimed at the user who wants to wring the maximum value from Microsoft's GUI, not the casual or first-time user.

It follows the same kind of layout as *Windows 3.1 Made Easy*, with a minimum of icons, but plenty of text, examples and explanations. In this case, the layout suits the style of the book much better. There are heaps of tables, lists and setting options which give an extremely wide range of possibilities for all types of hardware and software users.

Likewise, setting up printer/ font and network options/installations are well covered, as is troubleshooting and video problem solving. A complete listing of all the files Windows has and makes, what they should and can look like, and how to tweak them is also provided. It is hard to find an area Sheldon has left out, even if his style is a little dry.

As you would expect, there's less space devoted than other editions on how to use Write/Paintbrush, etc. This would be a pointless manual duplication, and I believe it's paper well saved. More space is devoted to useful areas such as sound, multimedia and hard disk configurations, which are well referenced in the index, too.

Obviously, in a book that claims to be the complete reference, you would expect many words devoted to PIFs, SYS, BATs and device drivers. You won't be disappointed. There's heaps, as well as plenty on automating tasks, linking and embedding, memory management and speed maximising.

So if you are technically minded, and don't need fancy modem typefaces and layouts, lots of icons and a pocket-sized book, this could be the one that will put a shine on your Windows.

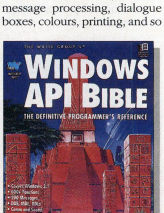
Windows API Bible

Publisher: Waite Group Press
Author: James Conger
Distributor: Woodslane
Telephone: (02) 997 3382
Price: $85
ISBN: 1-878739-15-8

Subtitled the Definitive Programmers Reference, this is a whopper of a book. *Windows API Bible* has well over 1000 pages, but in line with the environmentally aware philosophy currently abroad in Silicon Valley, it also contains a pledge to plant more trees. That makes me feel good.

If you are a C programmer, and want to get to grips with over 800 functions and the 350 source code examples listed, then this book will give you plenty of excuses to burn the midnight oil. Beginning with a simple introduction to a basic window, James Conger gently takes the would-be programmer through virtually all aspects of Windows programming.

All the code has been updated to include the latest features bundled into Windows 3.1, and there is a six-page tear-out reference card included to help you find that elusive command. The book is simply structured: each function, such as message processing, dialogue boxes, colours, printing, and so



on, has its own chapter. Where cross-references are required, these are handled by title (not page numbers), so a degree of page flipping may be required in some instances.

Program listings are provided for most examples, together with a set of options for you to play around with to find your perfect run. There is also information on how to access external hardware; for example, how to build hypertext help links, and debugging DLLs.

The book's presentation is well suited for a reference — clear, concise and sparsely illustrated. This makes locating and checking code much easier than having to wade through pages of pretty but irrelevant pictures, icons, and so on.

The only thing I found against this book was the need to physically key in the examples. While it's good practice, it would be a big time saver if the examples listed were included on a disk.

As to being a bible, even Moses would agree: it comes pretty close.

Windows Programming — An Introduction

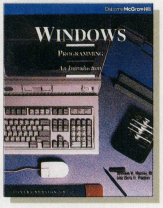
Publisher: Osborne/McGraw-Hill
Authors: William Murray III and Chris Pappas
Distributor: McGraw-Hill
Telephone: (02) 417 4288
Price: $61.95
ISBN: 0-07-881536-3

What can you say about a book like this? The cover proudly proclaims it covers Windows 3.0. In my view, that makes it a tad out of date.

First published in 1990, there must be more up-to-date versions than William Murray and Chris Pappas have penned here. Which is a shame, even if it only shows how rapidly computer software is developing. Because of its nature, *Windows Programming — An Introduction* is a reasonable guide to Windows programming.

Unlike many other programming books, it starts from the basic building blocks of Windows and lets you see how the various aspects come together to make up the final offering; for example, through accessing the Windows environment, to controlling the window and making your own dialogue boxes, icons and cursors.

The example listings are simple and easy to grasp, but the old Version 3.0 screenshots dampen the look. Well over 150 pages comprising functions



and index should enable easy access to the syntax of most commonly used commands. There's also a sample section of real-world code for a Presentation Manager graphing utility.

Other examples, however, are boxy and uninspired in their presentation, and do not really give that oomph you need to start creating jolly, jazzy Windows applications. Who wants to look at a sinewave?

When it comes down to it, this is now an old book, even if it's only three years old.

Windows 3.1 Graphics Programming

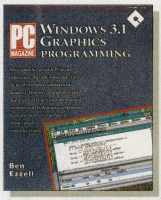
Publisher: Ziff-Davis Press
Author: Ben Ezzell
Distributor: Woodslane
Telephone: (02) 997 3382
Price: $69.95
ISBN: 1-56276-055-6

Out of the three programming volumes reviewed here, *Windows 3.1 Graphics Programming* is definitely the thinnest. Not that page count is an important measure of quality, of course. And it does contain a tutorial disk.

Unlike the *Windows API Bible*, this book seems like it has been designed to gently take the reader into the realms of Windows graphics programming via 20 odd but well designed and documented example programs. But this book's big bonus is that the Windows code comes on-disk; you won't get sore fingers entering all that information prior to running it.

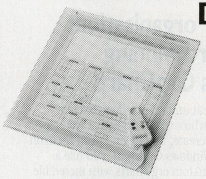
The source code is also printed out at the end of each chapter, but more as a cross-check than anything else. After a look at the basic concepts of programming, you move onto Windows' graphic device interface (GDI). Example areas covered comprise the capabilities of graphics coprocessors, extended graphic support, and making the most of SVGA cards and monitors.

The book's presentation style is a little dry, with many listing sections covering more than one page for the sake of uniform text size; it would seem better to print listings with a smaller type and fit them on one page. The fact that you have a disk copied with each chapter's code makes presented ideas much quicker and easier to understand — no time is wasted checking your entries for accuracy!



Other critical areas addressed are the problems encountered in outputting hard copy to varying dot-resolution printers as well as animation.

If you're looking to extend your Windows graphics skills, this book is a useful addition to any programmer's library.



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A double bite of Apple's software for BBS

When an unauthorised copy of System 7.1 found its way onto bulletin boards, users got more than they bargained for.

BY STEPHEN WITHERS

System 7.1, Apple's latest version of the Macintosh system software, started appearing on bulletin boards in Australia and the US about a month before its official release date. According to *PC Week* sources, the illicit code wasn't the beta copy provided to developers this winter, but the release version.

Earlier this year, Apple made it clear that Version 7.1 would not be licensed for distribution through bulletin boards, other online services or user groups. Previously, the attitude seemed to be, "Okay, you bought the Mac, so if you want to use the latest system software, that's fine by us." Now, it appears that System 7.1 and subsequent releases will only be sold by Apple, and the price will include a component for the code itself — buyers won't just be paying for the disks and manuals.

This makes the unauthorised distribution doubly unfortunate. Still, it is not clear what action — if any — Apple will take over the matter.

OZ-E-Mail

I don't normally mention commercial services in this column, but I'm going to make an exception for old times' sake. OZ-E-Mail is a public electronic-mail service initially offered as an extension to MHS-compatible LAN-based mail programs. The OZ-E-Mail Gateway supports multiple sessions through a single gateway.

Interfaces for Microsoft Mail for Windows and DOS, and cc:Mail will be available shortly, while individual users can dial OZ-E-Mail directly.

Some of the names behind OZ-E-Mail will be familiar to *APC* readers: managing director Sean Howard was this magazine's founder; former consultant editor and contributor Ian Davies is involved technically; and Gerard Kohne, former *APC* advertising executive, is on the marketing side of the operation.

OZ-E-Mail can be contacted on 008 805 874.

ES•F2F

In some ways similar to the ShareVision product I mentioned last month, ES•F2F is a software-based system for videoconferencing and document sharing. Like ShareVision, it is Macintosh-based, but instead of that system's integrated approach, ES•F2F works with most video-digitising boards and any network or communications link. For example, high-speed modems, AppleTalk and ISDN are all supported.

Despite the fact that no compression hardware is used, the developers claim an average performance of 15 frames per second.

ES•F2F's window-sharing component lets the receiver view a window from the sender's machine, but they cannot make alterations to it. Instead, an 'electronic crayon' is used to mark suggested changes or areas of interest, and the sender can then carry out any agreed changes. For more information, contact The Electronic Studio in the UK on (071) 387 7474, fax (071) 387 9793.

Modems

Interlink Electronics' Fastbit II CP modems represent an incremental improvement on the original Fastbit models. The CP suffix denotes constant port speed, a feature that has been incorporated for a small increase in price.

Constant port speed means that the computer and modem communicate at a fixed rate, regardless of the connection speed between the modems. The benefits: you don't need to change speeds for different services and, according to Interlink officials, throughput is increased by up to 10 per cent (at lower speeds) when compared with non-CP models.

This feature is nothing new, and has been available on Interlink's more expensive modems (as well as modems from other manufacturers) for some time. However, Interlink deserves congratulation for making the improvement available to existing customers in the form of a $78 upgrade.

The Fastbit II CP costs $599 and provides speeds of up to 12,000 bits per second (bps). The $699 Fastbit IIbis has a top speed of 14,400bps. Both modems can be upgraded to the IQ model, which includes MNP 5 data compression and other additional features, such as data encryption.

Contact Interlink Electronics on (02) 362 4344, fax (02) 327 7075. (Offices are located Australia-wide.)

New systems

NSW

Enhancement Solution BBS (02) 901 3750. P. Anthony Vigona. V.21, V.22, V.22bis, V.23, V.32, V.32bis. 24 hours.

Netware Support BBS (02) 555 1326. MV. Richard McDonald. V.21, V.22, V.22bis, V.23. FidoNet 3:713/900. 24 hours.

Odessey BBS (02) 869 2033. P. Peter De Rossi. V.21, V.22, V.22bis, V.23. 24 hours.

Offline BBS (02) 559 3839. P. Thomas Dyer. V.21, V.22, V.22bis. Daily: 0900 — 1730, 11pm-7am daily.

Sirius BBS (02) 560 6046. MV. Tom Lohdan. V.21, V.22, V.22bis. FidoNet 3:712/719.3. 9pm-8am daily.

Technology Gone Wild (02) 545 1132. MV. Todd Wright. V.21, V.22, V.22bis, V.23. FidoNet 3:712/408. 24 hours.

Budgewoi BBS (043) 99 2590. P. Peter Nicolas. V.21, V.22, V.22bis, V.23, V.32. FidoNet 3:711/439. 24 hours.

Player's BBS (049) 34 5005. P. John Fisher. V.21, V.22, V.22bis, V.23. FidoNet 3:622/411. 24 hours.

The Don BBS (06) 236 9384. P. Donovan Ryan. V.21, V.22, V.22bis, V.23. 9:30pm-7:30am daily.

ZZap BBS (049) 42 8176. P. Simon Phillips. V.21, V.22, V.22bis. FidoNet 3:622/403.2. 9pm-7am Mon — Sat, 24 hours Sun.

Vic

Black Box Catalog BBS (03) 879 5009. P. Andrew Wale. V.22bis. 24 hours.

Colossus of Rhodes (03) 376 4683. M. Nick Varvaris. V.22, V.22bis, V.32, V.32bis. 24 hours.

Sound FX (03) 749 5556. M. Bob Crockford. V.21, V.22, V.22bis, V.32, V.32bis. 24 hours.

SURF BBS (03) 798 4586. P. Robert Barcikowski. V.21, V.22, V.22bis, V.23, V.32, V.32bis. FidoNet 3:633/259. 9pm-7am daily.

Swag BBS (055) 25 0462. MV. Craig Delahoy. V.21, V.22, V.22bis, V.23, TrailBlazer. 6pm-7am weekdays, 24 hours weekends.

THE PiT! (03) 742 4102. MV. Ian Waters. V.22bis, V.32. 24 hours.

Yavaneh College BBS (03) 523 7120. MV. Mark Hampel. V.21, V.22, V.22bis. FidoNet 3:634/380. 24 hours.

Qld

Blitz BBS (075) 720 719. P. Steve Bignell. V.21, V.22, V.22bis. 8pm-7am daily.

MAQ Nexus (07) 847 2066. MV. Graham Kirkpatrick. V.21, V.22, V.22bis, V.23. 24 hours.

The Club BBS (075) 77 4172. MV. Roger Garrod. V.22, V.22bis. 24 hours.

The Farmers BBS (076) 91 6258. MV. Tony Carlaw. V.21, V.22, V.22bis, V.23, V.32. FidoNet 3:640/450. 24 hours.

The Gnarly BBS (07) 209 9214. P. Brad Dwyer. V.21, V.22. 9pm-6:30am daily.

SA

Blue Lake BBS (08) 723 1354. MV. Derek Hateley. V.21, V.22, V.22bis. 5pm-9am weekdays, 24 hours weekends.

WA

Australia Online (09) 382 2129. MV. David Sauzier. V.21, V.22, V.22bis, V.23, V.32, V.32bis. 24 hours.

Kwinana Old Codgers BBS (09) 419 5171. MV. John Storey. V.21, V.22, V.22bis, V.23. 24 hours.

PineGap BBS (097) 91 2565. M. Scott Pitick. V.21, V.22, V.22bis, V.23, V.32, V.32bis. 24 hours.

Tas

LAN BBS (002) 781 982. MV. Harry Vollmar. V.21, V.22, V.22bis, V.23, V.32, V.32bis. FidoNet 3:670/202. 24 hours.

Nightmare BBS (002) 781 363. MV. Harry Vollmar. V.21, V.22, V.22bis, V.23. FidoNet 3:670/210. 24 hours.

The Solar Connection (003) 99 3492. MV. Jason Camino. V.21, V.22, V.22bis, V.23, V.32. FidoNet 3:670/303. 24 hours.

Updates

NSW

Acropolis BBS (02) 669 2473. P. John Simonides. V.21, V.22, V.22bis, V.23, V.32. FidoNet 3:711/920.5. 9pm-7am daily.

The information in this column is provided by the Australian BBS Registry. It is presented in good faith but *APC* cannot take responsibility for its accuracy. New information and updates should be sent to the Registry Co-ordinator in your state.

You can also post BBS List news onto the EchoMail conference, BBS_NEWS, which is available nationally as a public area. Netmail BBS List enquiries to Rodney Creer at 3:713/317. Postal registrations to PO Box 731, Penrith NSW 2751.

National Rodney Creer, Australian BBS Registry, (047) 35 6362, FidoNet: 3:713/317, PO Box 731, Penrith NSW 2751

NSW Greg Kuhnert, 2000 and Beyond AliveBBS, (02) 544 7123, FidoNet: 3:712/513

Vic Richard Stocks, The Offline BBS, (03) 808 4510, FidoNet: 3:633/374

ACT Craig Gibson, Caught in the ACT BBS, (06) 292 8288, FidoNet: 3:620/252

Qld James Collins, The Galaxy GateWay Computer System, (074) 26-8557, FidoNet: 3:640/230

SA/NT Grayham Smith, Oracle PC-Network, (08) 234 0791, FidoNet: 3:800/804

WA Graeme Platt, 1990 Multiline, (09) 370 3333, FidoNet: 3:690/254

Tas Roy Austen, Tassie DataBank, (003) 44 9762, FidoNet: 3:670/301

Format of listings

Entries in our listings contain the following information: system name, telephone number, access, operator's name or alias, supported modem standards, network node number and hours of operation.

The access code may be P (Public), M (Members/registered users only), MV (as M, but with limited Visitor access).

The main modem standards are V21 (300bps), V22 (200bps), V22bis (2400bps), V23 (1200/75bps) and V32 (9600bps). HST and Trailblazer are de facto high-speed standards, while Bell 103 and 212 are the US standards for 300 and 1200bps operation.

The three main BBS networks in Australia are FidoNet, GTnet and SIGnet.

These networks provide a way of sending messages between boards, whether they are in the same suburb or half a world apart.

Amiga Action BBS Possibly offline.
Big Bang Burger Bar Permanently offline.
Blackboard BBS Temporarily offline.
Games Unlimited (02) 524 0057. P. Zoran Ananijev & Markus Goebel. V.21, V.22, V.22bis, V.23. 24 hours.
Hardware Hacker BBS Permanently offline.
Jon's Junkyard BBS Permanently offline.
NorthLand BBS (02) 498 7556. P. Iain Nixon. V.21, V.22, V.22bis, V.32, TrailBlazer. FidoNet 3:711/922. 24 hours.
Sierra Online Sydney Style (02) 748 4512. V. Troy Smith. V.21, V.22, V.22bis, V.23. 24 hours.
Syncopation Temporarily offline.
The Big Apple Permanently offline.
The C.I.A. — NOT THAT ONE! Possibly offline.
The Castle BBS Permanently offline.
The City Bulletin Board (02) 456 4895 Multi-Line. P. John Dawson. V.21, V.22, V.22bis, V.23, V.32, V.32bis. FidoNet 3:711/410. 24 hours.
The Hackers Haven Permanently offline.
The Highlander BBS See NorthLand BBS.
The Post BBS Permanently offline.
The Smorgas-Board Permanently offline.
The Vigour Force System (02) 894 6007. P. Tim Smith. V.22, V.22bis, V.23, V.32, V.32bis. 24 hours.
Zoo Lake Grunters (02) 938 5707. MV. Peter & Mark Laurence. V.21, V.22, V.22bis, V.32. FidoNet 3:714/910. 24 hours.
M I D I B B S (Newcastle) Permanently offline.
Mindari BBS Permanently offline.
The Computers & Things BBS Possibly offline.
The Widget Board Permanently offline.
X-Xenon BBS Permanently offline.

Vic

Dataflex Developers & Users Group BBS (03) 563 9135. V. Peter Tawse. V.22, V.22bis, V.32. FidoNet 3:632/339. 24 hours.
Eastcom BBS (03) 800 2692. P. Keith Haslam. V.21, V.22, V.22bis. FidoNet 3:632/312. 24 hours.
The Contact Point (03) 689 5728. MV. Colin Iliffe. V.21, V.22, V.22bis, V.32, V.32bis. FidoNet 3:633/367. 24 hours.
The Eastern Online BBS Permanently offline.
The Roaring Rapids (03) 894 4400. MV. Greg Holloway. V.21, V.22, V.22bis, V.23, V.32, V.32bis. FidoNet 3:634/391. 24 hours.
The Surgery BBS (03) 576 0287. P. The Doctor. V.21, V.22, V.22bis, V.23, V.32. 24 hours.
Thunderdome BBS (03) 338 0739. V. Ian Mason. V.22, V.22bis, V.32, V.32bis. FidoNet 3:633/368. 24 hours.
VicFlex BBS See Dataflex Developers and Users Group BBS.

ACT

ASTRAL BBS Permanently offline.
CFM McAfee's — Canberra Permanently offline.
Palladium BBS Permanently offline.
The Outpost Temporarily offline.

Qld

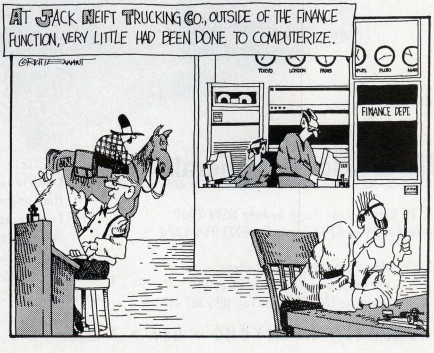
Alpha BBS Possibly offline.
Black Cat BBS Possibly offline.
CFM McAfee's — Townsville Possibly offline.
Clown BBS (074) 78 1094. P. Ian and Lorraine Johnson. V.21, V.22, V.22bis. 24 hours.
Community Information Service — Cairns Possibly offline.
Comtel BBS Permanently offline.
D Best B.B.S. Permanently offline.
Daniel's Domain Permanently offline.
Dragnet BBS Possibly offline.
Future Shock Permanently offline.
Happy Rocks BBS Permanently offline.
High Flyer BBS Permanently offline.
Immortal Justice BBS Permanently offline.
Information Unlimited (070) 53 1087. P. Rodney Davies. V.22, V.22bis, V.23, V.32. FidoNet 3:640/534. 24 hours.
Jail Breaker BBS Permanently offline.
Krypton BBS Permanently offline.
Little Greece BBS Permanently offline.
Michael's Scouting Permanently offline.
Night Moves BBS Permanently offline.
STarlink BBS Possibly offline.
Steve's Place BBS Permanently offline.
Sunshine Coast Connection Possibly offline.
The BBS Co Permanently offline.
The Computer Graveyard Permanently offline.
The Galaxy GateWay Computer System (074) 26 8557 Multi-Line. MV. James Collins. V.22, V.22bis, V.32. FidoNet 3:640/316. 24 hours.
The Linenoise BBS Permanently offline.
Welcome to the Pleasuredome (075) 93 0906. P. Eric Cassimatis. V.21, V.22, V.22bis, V.23, V.32bis. 24 hours.
ZYGOnet! BBS Permanently offline.

SA

Alternate Reality Temporarily offline.
RAVEN BBS Permanently offline.

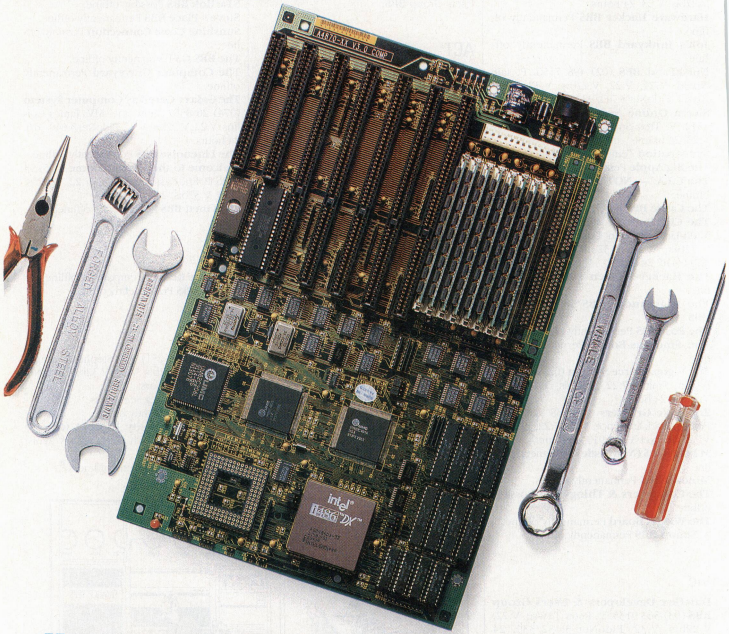
WA

Abyss (09) 245 2511. MV. Stephen Darragh. V.21, V.22, V.22bis, V.23, V.32bis. FidoNet 3:690/101. 24 hours.
Ancient Mallorea See Abyss.
macBBS Permanently offline.
Murdoch University ES-BBS1 (09) 360 2873. MV. Scott Smith. V.21, V.22, V.22bis, V.23. 24 hours.
The Realm Permanently offline.



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Norton Backup for Windows	179
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Prof Write Plus for Windows	**219**
Quattro Pro WinDOS	**599**
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SuperBase 4 Developers Ed.	**1299**
Timeline for Windows	**799**
Venture Publisher Gold	**939**
Ventura Database Publisher	399
WordPerfect	539
XTree for Windows	**69**

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Central Point software	**CALL!!!**
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Harvard Project Manager	639
IBM OS/2 Ver 2 (Full product)	249
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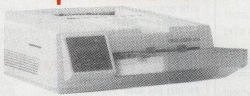
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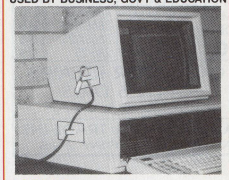
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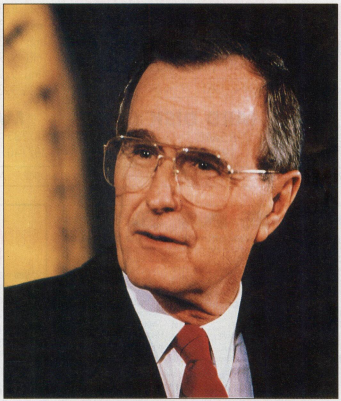
What do politicians and bugs have in common? The answer may seem obvious, but our supersleuths tracked down some current US definitions, as well as lifted the lid on Microsoft's sealed section, a word processor love affair, and more . . .

With the US election all but over, US computing professionals have been having fun dreaming up viruses that fit the qualities of the candidates and publishing them on bulletin boards. The George Bush virus does nothing, but it won't disappear until November. The Bill Clinton virus mutates from region to region, while the Ross Perot strain, which only puts up a blank screen, seems to have had millions of dollars poured into its development.

Other political figures have also been used in the name of humour. The David Duke virus makes the screen turn completely white, while the Pat Buchanan virus shifts all output to the extreme right of the screen.

Moving back into history, the Richard Nixon virus can be wiped out, but always manages to return, while the Warren Commission virus prevents files from being opened for around 75 years.

With a Federal election not too many months away, Chip Chat thought it would be fun to see what Australian viruses are lurking out there. The best suggestion for an Australian political virus will win a copy of Dr Solomon's Anti-Virus Toolkit, compliments of Chip Chat. Entries must be sent to Chip Chat Virus Competition, *Australian Personal Computer*, Level 6, 54 Park St, Sydney NSW 2000, by close of play on November 30.

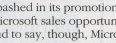




Chip Chat is vaguely familiar with the Black Label edition of a certain men's magazine, which contains the bits considered too naughty for the general reader.

But Chip Chat was amused to find that Microsoft is also into Black Label publications. In this case, it's the Black Label edition of *Communiqué*, the magazine that casts a not-too-critical eye over Microsoft products for the members of the Communiqué Club.

The Black Label edition has been compiled for dealers and contains restricted information such as dealer prices. It is also far more unabashed in its promotion of Microsoft sales opportunities. Sad to say, though, Microsoft has not carried the concept through to a program-of-the-month centrefold.



The notable exception in the brawl between various software companies over the results of 'independent' tests has been Lotus Development. With Microsoft taking on Borland and WordPerfect accusing Microsoft of biased tests, Lotus has taken a different tack — let people make their own minds up, rather than rely on controversial third-party tests.

Indeed, announcing Ami Pro 3.0, Lotus sent the media a gavel, inviting them to judge between Word for Windows and Ami Pro 3.0. An unofficial court transcript featured a dialogue between the prosecution and a Windows user over exhibits such as SmartMerge, Drag and Drop, Fast Format and other Ami Pro 3.0 traits. Here's an excerpt:

'Prosecution: Now please tell the court about your relationship with SmartIcons. You do admit to having a close, personal relationship with SmartIcons, don't you? Would you go so far as to say you love SmartIcons, Ms User?

Windows User: I love my SmartIcons and am not afraid to admit it. Sure, Word has icons, but Ami Pro's SmartIcons are so much more attractive . . . more responsive . . .'

You get the gist. The scene concludes with the witness becoming totally out of control: 'Ami 3.0 is the best word processor for Windows and I'm not going back to anything else. I'll never go back, you can't force me! Not you, not this court, not anyone!'

It may be no more believable than Microsoft saying WordPerfect users would rather use Word for Windows,

Down the line

➤ You've got to hand it to IBM Australia. With US-based IBM releasing 18 new PS/1s and a plethora of new PS/2 and ValuePoint systems, the local subsidiary has opted for the KISS principle: **Keep It Simple Stupid**. By introducing just two new PS/1 systems, two 'value' PS/V systems and progressively announcing new PS/2s, the local subsidiary has been heavily influenced by its desire to keep its Wangaratta, Victoria, factory viable. Announcing a complete product range in step with the US must have been tempting for Steve Vamos and the **cash-strapped** local Personal Systems division. But it would also have meant importing a number of the new lines while Wangaratta was still tooling up.

Not only is IBM Australia offering a simplified product line, compared with its US counterpart, it has involved another subsidiary, IBM Japan, in the design of the PS/V systems, presumably with an eye to exports to the Asian region.

The resolve of local IBM executives to keep Wangaratta viable is laudable, given the likelihood of a change of government at the next federal election. If John Hewson's Liberals, with their **flat-earth tariffs policy**, replace the current Labor government, it's unlikely that IBM Australia will earn any brownie points from its local factory. With a Hewson government, the only possible justification for Wangaratta will be profits. For the balance of payments sake, let's hope IBM Australia knows what it's doing.

➤ It seems Intel is still in no mood to reveal what it will call its next-generation P5 chip. But if rumours from Silicon Valley can be believed, the 'P' could stand for **pyrogenic** (producing heat or fever — *The Macquarie Dictionary*). Many are now saying that the company had ulterior motives in delaying the release of the chip.

While Intel officials said at the time it was still selling so many 486s that it seemed a shame to spoil a good thing, killjoys are now saying that prototype P5s are **burning up in the lab**. Just as Intel had trouble cranking the 486 up to 50MHz — mark my words, those 50MHz 486 parts will be a collector's item one day — Intel has been unable to run P5s at the required 66MHz, according to sources. Consequently, Intel engineers are breaking into a sweat trying to make the new quarter deadline.

➤ And speaking of delays, it's amazing how fortunes change in the desktop operating systems business.

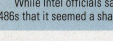
A couple of months ago, with all the hoopla surrounding Windows NT at Windows World, and a commensurate lack of hype at IBM developer events, many commentators believed OS/2 2.0 was **down for the count.** But now that Microsoft has announced its NT development effort is running behind schedule, the New Technology juggernaut is running out of steam.

No sooner had senior Microsoft officials said that March was the most likely release date, than sources from companies closely aligned with the world's biggest software company contradicted them. In the same breath that sources close to DEC said that workstations based on the company's upcoming 64-bit Alpha chip would be released at the same time as Windows NT, they also announced it was expected to be closer to mid-to-late 1993. Microsoft officials, however, have said that a third-quarter release is "impossible."

Users who are hoping for a bug-free first version of NT must be getting nervous. With the numbering starting at Version 3.1 in 1993, and Microsoft's famous **'third time lucky'** track record, users may need to wait for Version 5.1 and 1995 before NT settles down enough for serious applications. By which time, OS/2 could well be a corporate standard, and IBM and Apple's Pink, the flavour of the month.

Chris Bowes

but it is a little more entertaining.



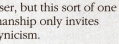
Apple has joined the comparative showdown game too, with a series of ads boasting the value for money of its systems. It commissioned a mob called International Research Bureau to compare the cost of an Apple Macintosh with a 386SX MS-DOS computer running Windows 3.1. Not surprisingly, the report concluded that the Macintosh LC II is cheaper than a similarly configured name-brand PC, name-brand clone PC or a clone PC.

In order to compare Apples with apples, the MS-DOS PC was equipped with a Microsoft mouse, a 256-colour graphics card, a SoundBlaster Pro 2 sound card, 4M of RAM, Windows 3.1 and Norton Desktop for Windows. In addition, both platforms were equipped with a low-speed network card and Microsoft applications software. An hour of consulting advice was added to both bills, as were two hours of labour to fit the MS-DOS add-ins.

Chip Chat's perusal of the report shows that the interpretation is a little one-sided. For instance, Norton Desktop for Windows is added 'to boost limitations in the Windows environment [such as file undelete]'. That adds $219 to the price. The $427 price of the graphics card was added to the total without considering that it would replace any standard graphics card in a new machine.

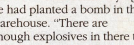
The MS-DOS platforms also came with a 14in display, compared to the Macintosh's 13in display, and the MS-DOS hard disks were up to 120M, compared to the 80M on the Apple. Word for Windows for MS-DOS also cost $80 more than the Macintosh equivalent.

When these factors are taken into account, it is certainly not lay-down misère for the Macintosh, as the report implies. The Trade Practices Commission received complaints, and was reportedly going to ask Apple to explain. Chip Chat recognises that both Macintosh and Intel/Windows platforms are well suited to the needs of the PC user, but this sort of one upmanship only invites cynicism.



When businesses rely so heavily on computers, what happens when they go wrong? Customers at a supermarket in Bristol, England, found out that when the computer is down, so are prices. The unfortunate store had a computerised pricing system, similar to that used in many supermarkets.

Something brought the system down, meaning prices were unavailable to checkout staff, who resorted to asking customers to make an offer for what they need in their trolleys. Did they get bargains? Is the Pope Catholic? "It was a nightmare," said the store manager.



Staff at Gestetner Laser's Sydney headquarters had an unexpected telephone call last month — from a man saying he had planted a bomb in the warehouse. "There are enough explosives in there to send the place sky high," he said.

An orderly evacuation of the premises took place, and the police were called in. They made a cursory search, but when the time for the bomb to explode approached, staff were told to stick their fingers in their ears. Fortunately, nothing happened.

Gestetner management said this was not the first bomb alert at the site, which it shares with Hanimex. Hanimex has had similar calls, and believes it may be a former employee after a little revenge.

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